YAMAHA

BT1100 2002

5JN1-AE1

SERVICE MANUAL

EASB0000

BT1100 2002
SERVICE MANUAL

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EASB0001

NOTICE

This manual was produced by the Belgarda S.p.A. primarily for use by Yamaha dealers and their qualified mechanics. It is not possible to include all the knowledge of a mechanic in one manual. Therefore, anyone who uses this book to perform maintenance and repairs on Yamaha vehicles should have a basic understanding of mechanics and the techniques to repair these types of vehicles. Repair and maintenance work attempted by anyone without this knowledge is likely to render the vehicle unsafe and unfit for use.
Belgarda S.p.A. is continually striving to improve all of its models. Modifications and significant changes in specifications or procedures will be forwarded to all authorized Yamaha dealers and will appear in future editions of this manual where applicable.

NOTE:
Designs and specifications are subject to change without notice.

EAS00004

IMPORTANT MANUAL INFORMATION

Particularly important information is distinguished in this manual by the following.

⚠	The Safety Alert Symbol means ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVED!
⚠ WARNING	Failure to follow WARNING instructions could result in severe injury or death to the motorcycle operator, a bystander or a person checking or repairing the motorcycle.
CAUTION:	A CAUTION indicates special precautions that must be taken to avoid damage to the motorcycle.
NOTE:	A NOTE provides key information to make procedures easier or clearer.

EAS00007

HOW TO USE THIS MANUAL

This manual is intended as a handy, easy-to-read reference book for the mechanic. Comprehensive explanations of all installation, removal, disassembly, assembly, repair and check procedures are laid out with the individual steps in sequential order.

① The manual is divided into chapters. An abbreviation and symbol in the upper right corner of each page indicate the current chapter.
Refer to "SYMBOLS".

② Each chapter is divided into sections. The current section title is shown at the top of each page, except in Chapter 3 ("PERIODIC CHECKS AND ADJUSTMENTS"), where the sub-section title(s) appears.

③ Sub-section titles appear in smaller print than the section title.

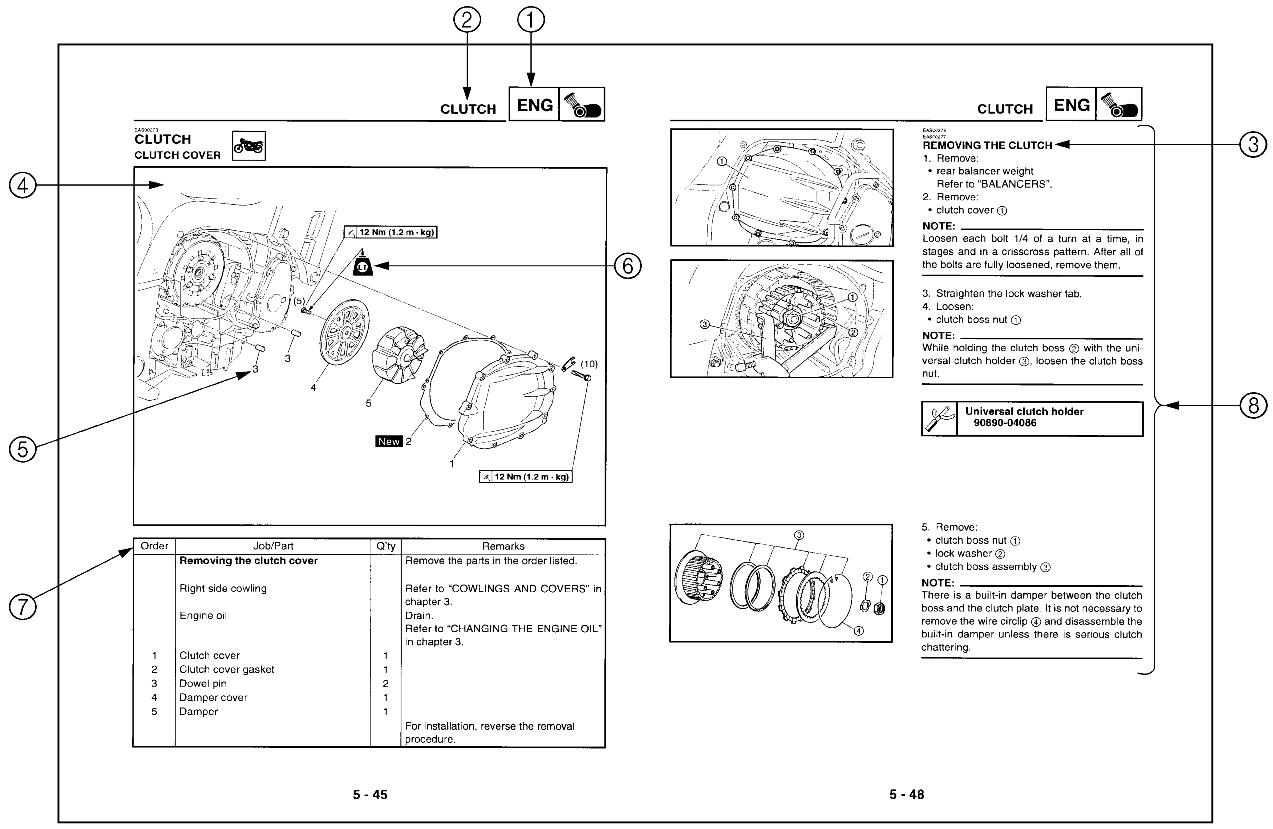
④ To help identify parts and clarify procedure steps, there are exploded diagrams at the start of each removal and disassembly section.

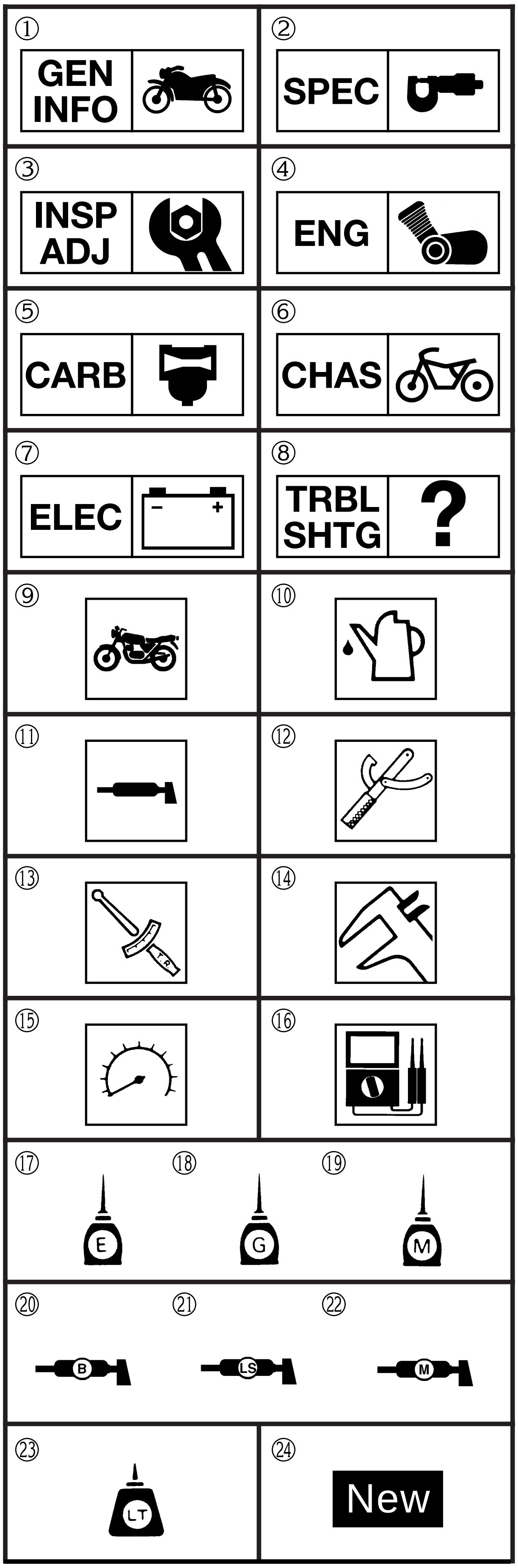
⑤ Numbers are given in the order of the jobs in the exploded diagram. A circled number indicates a disassembly step.

⑥ Symbols indicate parts to be lubricated or replaced.
Refer to "SYMBOLS".

⑦ A job instruction chart accompanies the exploded diagram, providing the order of jobs, names of parts, notes in jobs, etc.

⑧ Jobs requiring more information (such as special tools and technical data) are described sequentially.





EB003000

ILLUSTRATED SYMBOLS

The following symbols are not relevant to every vehicle.

Illustrated symbols ① to ⑧ are printed on the top right of each page and indicate the subject of each chapter.

① General information
② Specifications
③ Periodic inspections and adjustments
④ Engine
⑤ Carburetion
⑥ Chassis
⑦ Electrical
⑧ Troubleshooting

Illustrated symbols ⑨ to ⑯ are used to identify the specifications appearing in the text.

⑨ Can be serviced with engine mounted
⑩ Filling fluid
⑪ Lubricant
⑫ Special tool
⑬ Torque
⑭ Wear limit, clearance
⑮ Engine speed
⑯ Electrical data

Illustrated symbols ⑰ to ㉒ in the exploded diagrams indicate the types of lubricants and lubrication points.

⑰ Apply engine oil
⑱ Apply gear oil
⑲ Apply molybdenum disulfide oil
⑳ Apply wheel bearing grease
㉑ Apply lightweight lithium-soap base grease
㉒ Apply molybdenum disulfide grease

Illustrated symbols ㉓ to ㉔ in the exploded diagrams indicate the following:

㉓ Apply locking agent (LOCTITE®)
㉔ Replace the part

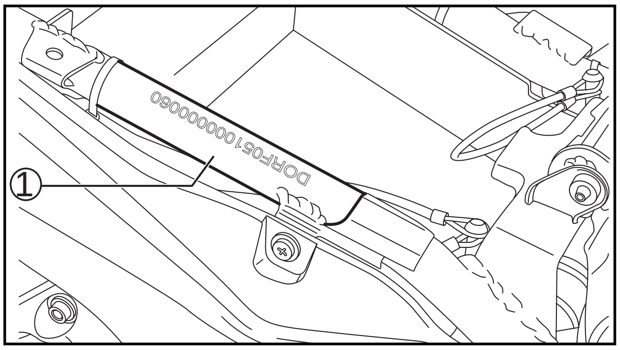
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GEN INFO

1

CHAPTER 1.
GENERAL INFORMATION



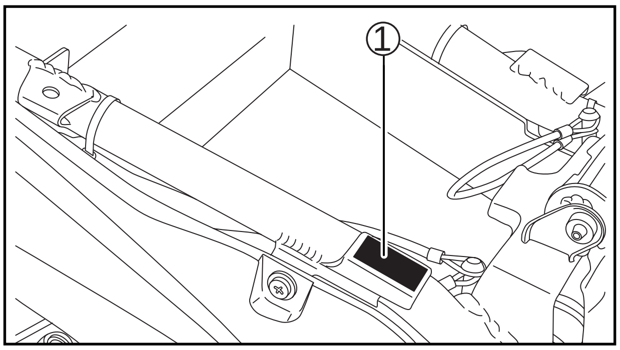
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GENERAL INFORMATION

MOTORCYCLE IDENTIFICATION

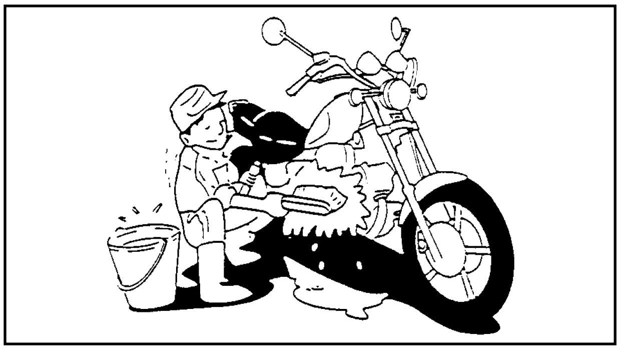
VEHICLE IDENTIFICATION NUMBER

The vehicle identification number ① is stamped into the frame under the seat.



MODEL LABEL

The model label ① is affixed to the frame under the seat.
This information will be needed to order spare parts.



EB101000

IMPORTANT INFORMATION

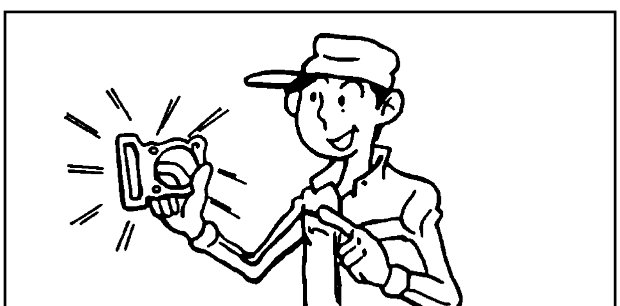
PREPARATION FOR REMOVAL PROCEDURES

1. Remove all dirt, mud, dust and foreign material before removal and disassembly.



300-008

2. Use proper tools and cleaning equipment. Refer to the “SPECIAL TOOLS” section.
3. When disassembling the machine, always keep mated parts together. This includes gears, cylinders, pistons and other parts that have been “mated” through normal wear. Mated parts must always be reused or replaced as an assembly.
4. During machine disassembly, clean all parts and place them in trays in the order of disassembly. This will speed up assembly and allow for the correct installation of all parts.
5. Keep all parts away from any source of fire.



300-016

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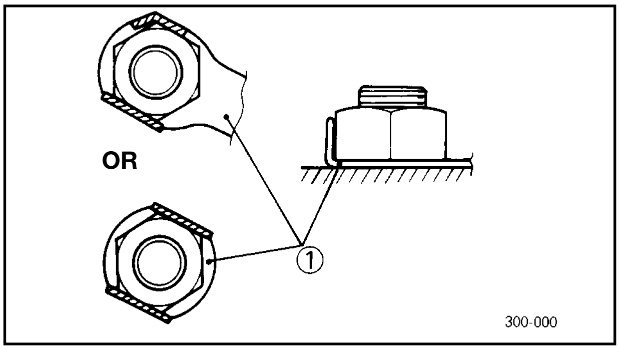
REPLACEMENT PARTS

1. Use only genuine Yamaha parts for all replacements. Use oil and grease recommended by Yamaha for all lubrication jobs. Other brands may be similar in function and appearance, but inferior in quality.

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GASKETS, OIL SEALS AND O-RINGS

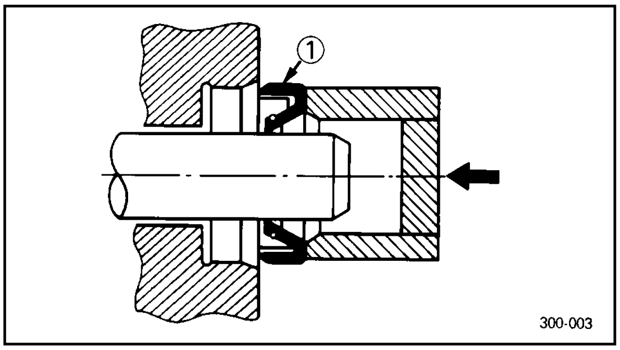
1. Replace all gaskets, seals and O-rings when overhauling the engine. All gasket surfaces, oil seal lips and O-rings must be cleaned.
2. Properly oil all mating parts and bearings during reassembly. Apply grease to the oil seal lips.



EB101030

LOCK WASHERS/PLATES AND COTTER PINS

1. Replace all lock washers/plates ① and cotter pins after removal. Bend lock tabs along the bolt or nut flats after the bolt or nut has been tightened to specification.



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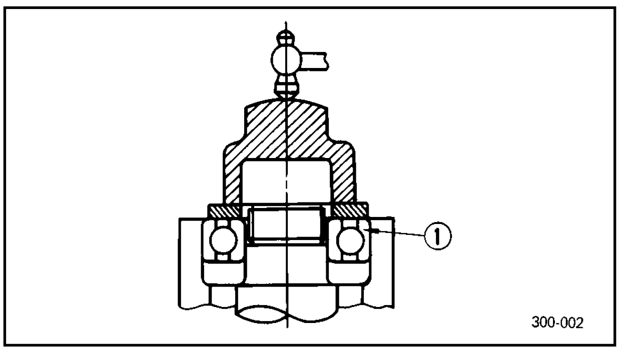
BEARINGS AND OIL SEALS

1. Install bearings and oil seals so that the manufacturer's marks or numbers are visible. When installing oil seals, apply a light coating of lightweight lithium base grease to the seal lips. Oil bearings liberally when installing, if appropriate.

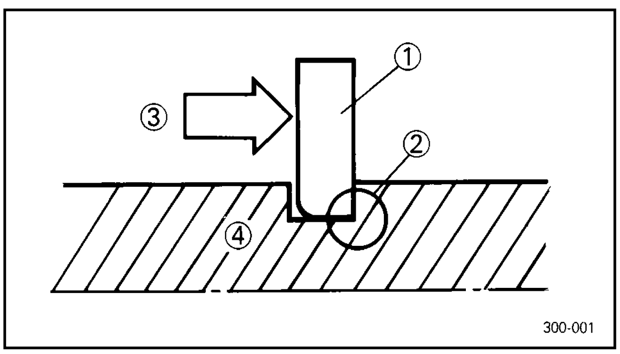
① Oil seal

CAUTION:

Do not use compressed air to spin the bearings dry. This will damage the bearing surfaces.



① Bearing

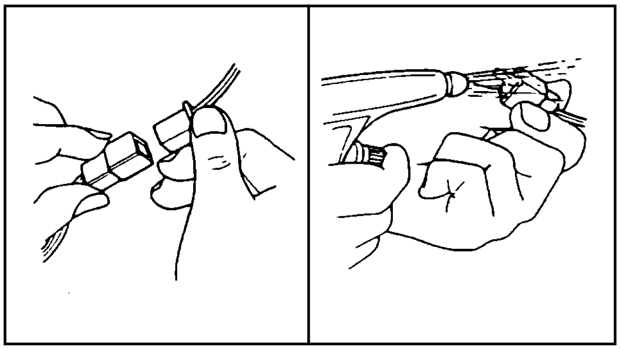


EB101050

CIRCLIPS

1. Check all circlips carefully before reassembly. Always replace piston pin clips after one use. Replace distorted circlips. When installing a circlip ①, make sure that the sharp-edged corner ② is positioned opposite the thrust ③ it receives. See sectional view.

④ Shaft

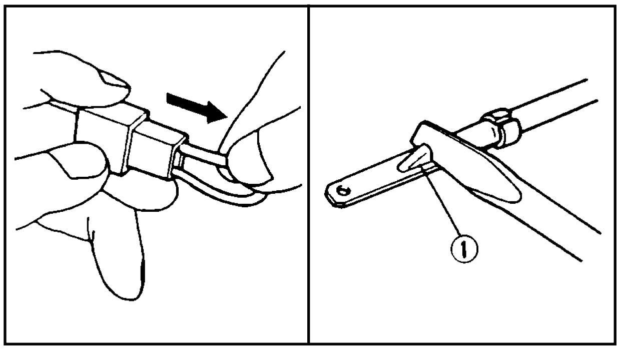


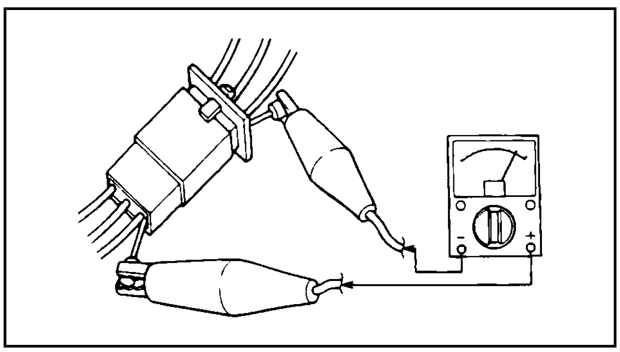
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CHECKING OF CONNECTIONS

Check the connectors for stains, rust, moisture, etc.

1. Disconnect:
   - connector
2. Check:
   - connector
     Moisture → Dry each terminal with an air blower.
     Stains/rust → Connect and disconnect the terminals several times.
3. Check:
   - connector leads
     Looseness → Bend up the pin ① and connect the terminals.

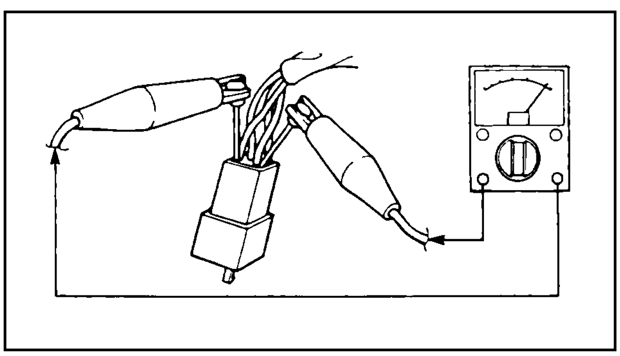




4. Connect:
   - connector terminals

NOTE:

The two terminals "click" together.



5. Check:
   - continuity (using a pocket tester)

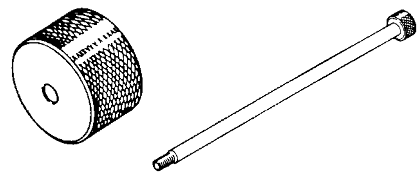
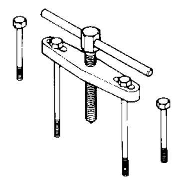
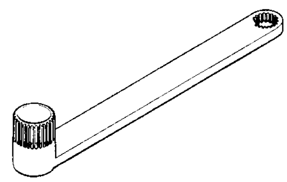
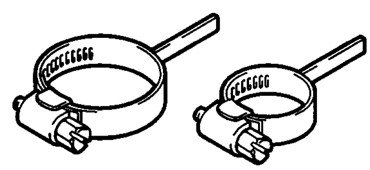
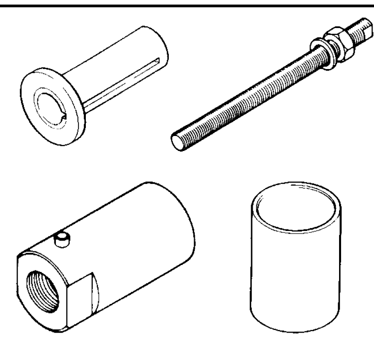
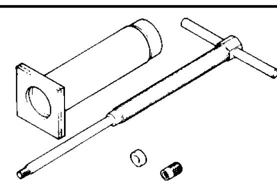
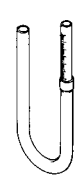
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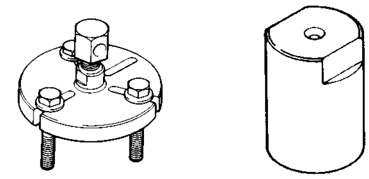
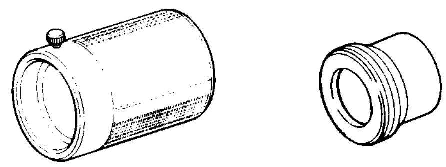
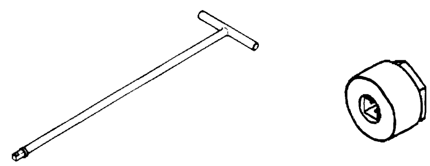
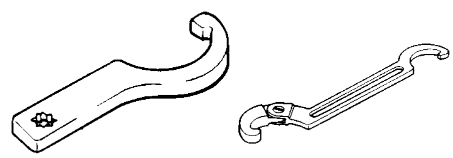
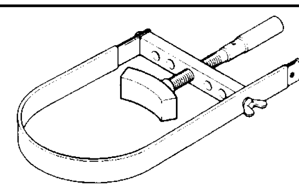
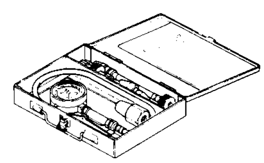
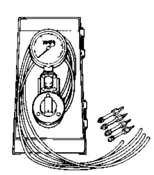
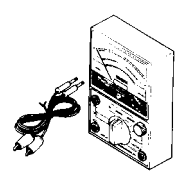
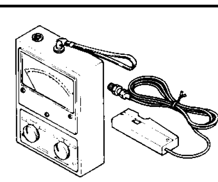
- If there is no continuity, clean the terminals.
- When checking the wire harness be sure to perform steps 1 to 3.
- As a quick remedy, use a contact revitalizer available at most part stores.
- Check the connector with a pocket tester as shown.

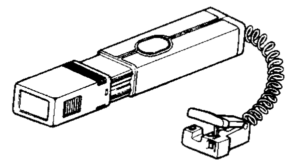
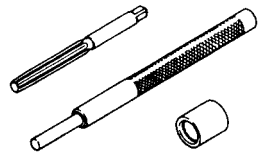
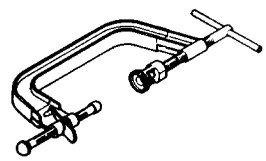
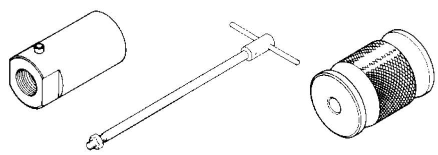
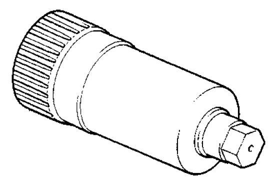
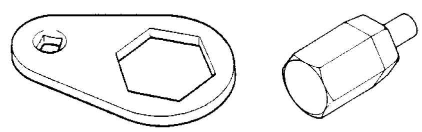
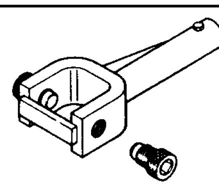
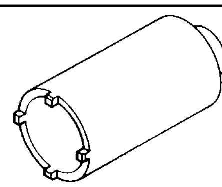
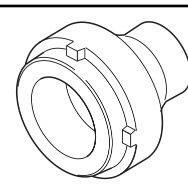
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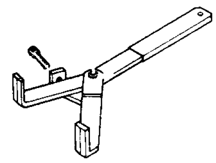
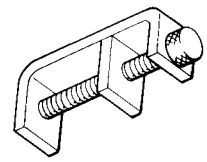
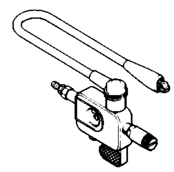
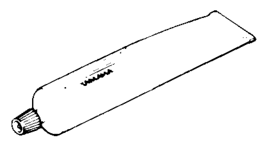
SPECIAL TOOLS

The following special tools are necessary for complete and accurate tune-up and assembly. Use only the appropriate special tools; this will help prevent damage caused by the use of inappropriate tools or improvised techniques. Special tools may differ by shape and part number from country to country. In such a case, two types are provided.
When placing an order, refer to the list provided below to avoid any mistakes.

Tool No.	Tool name/How to use	Illustration
Weight 90890-01084 Bolt 90890-01085	Slide hammer bolt/weight These tools are used to remove the rocker arm shaft.	
90890-01135	Crankcase separating tool This tool is used to remove the crankshaft.	
90890-01229	Coupling gear/middle shaft tool This tool is needed when removing or installing the final pinion shaft nut.	
Final gear backlash band 90890-01230 Middle gear backlash band 90890-01231	Final gear backlash band This tool is needed when measuring final gear/middle gear backlash.	
Installer pot 90890-01274 Bolt 90890-01275 Adapter 90890-04130 Spacer 90890-04060	Crankshaft installer pot/bolt/adapter/spacer These tools are used to install the crankshaft.	
90890-01304	Piston pin puller This tool is used to remove the piston pin.	
90890-01312	Fuel level gauge This gauge is used to measure the fuel level in the float chamber.	

Tool No.	Tool name/How to use	Illustration
Puller 90890-01362 Adapter 90890-04131	Flywheel puller/adapter These tools are needed to remove the rotor.	
Weight 90890-01367 Adapter 90890-01374	Fork seal driver weight/adapter (Ø 43 mm) These tools are needed when installing the slide metal, oil seal and dust seal into the fork.	
T-handle 90890-01326 Holder 90890-01327	T-handle/front fork damper rod holder These tools are needed to loosen and tighten the front fork damper rod holding bolt.	
Ring nut wrench 90890-01403 Exhaust nut wrench 90890-01268	Ring nut wrench/exhaust and steering nut wrench This tool is needed to loosen and tighten the steering stem ring nut.	
90890-01701	Sheave holder This tool is needed to hold the rotor when removing or installing the rotor bolt.	
90890-03081	Compression gauge set These tools are needed to measure engine compression.	
90890-03094	Vacuum gauge This gauge is needed for carburetor synchronization.	
90890-03112	Pocket tester This instrument is needed for checking the electrical system.	
90890-03113	Engine tachometer This tool is needed for observing engine r/min.	

Tool No.	Tool name/How to use	Illustration
90890-03141	Timing light This tool is necessary for checking ignition timing.	
90890-04014	Valve guide remover & installer This tool is needed to remove and install the valve guide.	
90890-04019	Valve spring compressor This tool is needed to remove and install the valve assemblies.	
Adapter 90890-01277 Shock puller 90890-01290 Weight 90890-01291	Crankshaft installer bolt adapter/armature shock puller/weight These tools are needed when removing the final pinion shaft.	
90890-04137	Bearing retainer wrench This tool is needed when removing or installing the middle drive shaft assembly.	
Wrench 90890-04138 Holder 90890-04055	Middle drive shaft nut wrench/Middle drive shaft holder These tools are needed when removing or installing the middle drive shaft bearing.	
90890-04062	Universal joint holder This tool is needed when removing or installing the driven pinion gear nut.	
90890-04077	Bearing retainer wrench This tool is needed when removing or installing the final drive pinion gear assembly.	
90890-04050	Bearing retainer wrench This tool is needed when removing or installing the final shaft drive bearing retainer.	

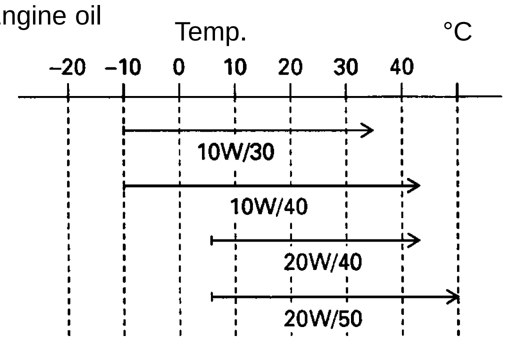
Tool No.	Tool name/How to use	Illustration
90890-04086	Clutch holding tool This tool is needed to hold the clutch when removing or installing the clutch boss nut.	
90890-04090	Damper spring compressor This tool is needed when removing or installing the damper spring.	
90890-06754	Dynamic spark tester Ignition checker This instrument is necessary for checking the ignition system components.	
90890-85505	Yamaha bond No.1215 This sealant (bond) is used on crankcase mating surfaces, etc.	

SPEC 2

CHAPTER 2.
SPECIFICATIONS

SPECIFICATIONS

GENERAL SPECIFICATIONS

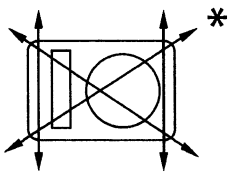
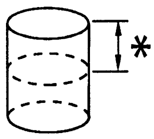
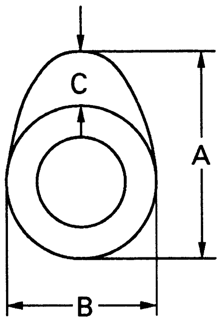
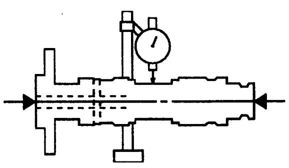
Item	Standard
Model code:	BT1100: 5JN1
Dimensions: Overall length Overall width Overall height Seat height Wheelbase Minimum ground clearance Minimum turning radius	 2,200 mm 800 mm 1,140 mm 812 mm 1,530 mm 168 mm 2,980 mm
Basic weight: With oil and a full fuel tank	 250.5 kg
Engine: Engine type Cylinder arrangement Displacement Bore × stroke Compression ratio Compression pressure (STD) Starting system	 Air cooled 4-stroke, SOHC V-type 2-cylinder 1.063 L 95 × 75 mm 8.3 : 1 1,000 kPa (10 kg/cm², 10 bar) at 400 r/min Electric starter
Lubrication system:	Wet sump
Oil type or grade: Engine oil 	 API standard: API Service SE, SF, SG or higher SAE 20W40SE or SAE 10W30SE ACEA standard: G4 or G5
Final gear oil:	SAE80 API "GL-4" Hypoid Gear Oil or multigrade hypoid gear oil SAE 80W-90
Oil quantity: Engine oil Periodic oil change With oil filter replacement Total amount Final gear case oil Total amount	 3.0 L 3.1 L 3.6 L 0.2 L
Air filter:	Dry type element
Fuel: Type Fuel tank capacity Fuel reserve amount	 Regular unleaded gasoline 20 L 5.8 L

Item		Standard
Carburetor:		
Type/quantity		BSR37/2
Manufacturer		MIKUNI
Spark plug:		
Type		BPR7ES/W22EPR-U
Manufacturer		NGK/DENSO
Spark plug gap		0.7 ~ 0.8 mm
Clutch type:		Wet, multiple-disc
Transmission:		
Primary reduction system		Spur gear
Primary reduction ratio		78/47 (1.660)
Secondary reduction system		Shaft drive
Secondary reduction ratio		44/47 × 19/18 × 32/11 (2.875)
Transmission type		Constant mesh 5-speed
Operation		Left foot operation
Gear ratio	1st	40/17 (2.353)
	2nd	40/24 (1.667)
	3rd	36/28 (1.286)
	4th	32/31 (1.032)
	5th	29/34 (0.853)
Chassis:		
Frame type		Twin tube Backbone
Caster angle		25°
Trail		106 mm
Tire:		
Type		Tubeless
Size	front	120/70-ZR17 (58W)
	rear	170/60-ZR17 (72W)
Manufacturer	front	DUNLOP / METZELER
	rear	DUNLOP / METZELER
Type	front	D205F TL / MEZ3F TL
	rear	D205 TL / MEZ3 TL
Maximum load-except motorcycle:		200 kg
Tire pressure (cold tire):		
0 ~ 90 kg load *	front	230 kPa (2.30 kg/cm²) (2.30 bar)
	rear	250 kPa (2.50 kg/cm²) (2.50 bar)
90 kg (198 lb) ~ Maximum load *	front	250 kPa (2.50 kg/cm²) (2.50 bar)
	rear	270 kPa (2.70 kg/cm²) (2.70 bar)
		* Load is the total weight of the cargo, rider, passenger and accessories.
Brake:		
Front brake	type	Dual disc brake
	operation	Right hand operation
Rear brake	type	Single disc brake
	operation	Right foot operation

Item	Standard
Suspension: Front suspension Rear suspension	 Telescopic fork Swingarm (link suspension)
Shock absorber: Front shock absorber Rear shock absorber	 Coil spring/Oil damper Coil spring/Gas-oil damper/Spring preload adjustable
Wheel travel: Front wheel travel Rear wheel travel	 130 mm 113 mm
Electrical system: Ignition system Generator system Battery type Battery capacity	 T.C.I. (digital) A.C. magneto GT14B-4 12V 12Ah
Headlight type:	Quartz bulb (halogen)
Bulb wattage × quantity: Headlight Auxiliary light Tail/brake light Turn signal Licence light Meter light Neutral indicator light High beam indicator light Turn indicator light Oil level warning light Fuel level warning light	 12 V 60 W/55 W × 1 12 V 5 W × 1 12 V 5 W/21 W × 1 12 V 10 W × 4 12 V 5 W × 1 14 V 1.2 W × 4 LED × 1 LED × 1 LED × 1 LED × 1 LED × 1

MAINTENANCE SPECIFICATIONS

ENGINE

Item		Standard	Limit
Cylinder head:			
Warp limit *		•••	0.03 mm
			
Cylinder:			
Bore size		95.00 ~ 95.01 mm	95.1 mm
Measuring point *		40 mm	•••
			
Camshaft:			
Drive method		Chain drive (left & right)	•••
Cam cap inside diameter		25.000 ~ 25.021 mm	•••
Camshaft outside diameter		24.96 ~ 24.98 mm	•••
Shaft-to-cap clearance		0.020 ~ 0.061 mm	•••
Cam dimensions:			
			
Intake	"A"	39.112 ~ 39.212 mm	39.012 mm
	"B"	#1: 32.093 ~ 32.193 mm #2: 32,127 ~ 32.227 mm	#1: 31.993 mm #2: 32.027 mm
	"C"	7.162 mm	7.012 mm
Exhaust	"A"	39.145 ~ 39.245 mm	39.045 mm
	"B"	32.200 ~ 32.300 mm	32.100 mm
	"C"	7.195 mm	7.045 mm
Camshaft runout limit		•••	0.03 mm
			

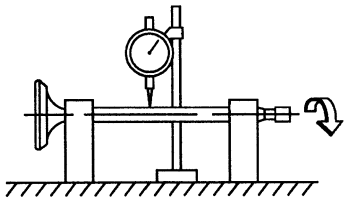
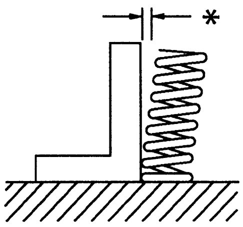
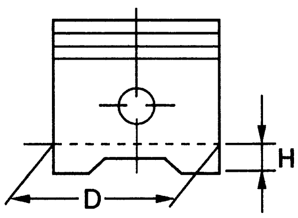
Item		Standard	Limit
Timing chain:			
Timing chain type/No. of links		SILENT CHAIN/98L	•••
Timing chain adjustment method		Automatic	•••
Rocker arm/rocker arm shaft:			
Bearing inside diameter		14.000 mm ~ 14.018 mm	14.036 mm
Shaft outside diameter		13.985 mm ~ 13.991 mm	13.95 mm
Arm-to-shaft clearance		0.009 mm ~ 0.033 mm	0.086 mm
Valve, valve seat, valve guide:			
Valve clearance (cold)	IN	0.07 ~ 0.12 mm	•••
	EX	0.12 ~ 0.17 mm	•••

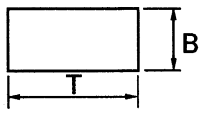
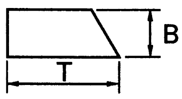
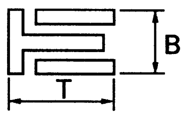
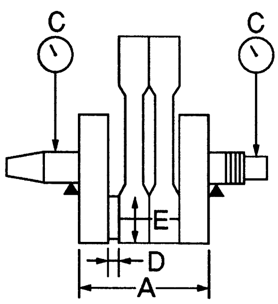
Valve dimensions:



Head Diameter Face Width Seat Width Margin Thickness

Item		Standard	Limit
"A" head diameter	IN	47.0 ~ 47.2 mm	•••
	EX	39.0 ~ 39.2 mm	•••
"B" face width	IN	2.1 mm	•••
	EX	2.1 mm	•••
"C" seat width	IN	1.2 ~ 1.4 mm	1.8 mm
	EX	1.2 ~ 1.4 mm	1.8 mm
"D" margin thickness	IN	1.1 ~ 1.5 mm	0.8 mm
	EX	1.1 ~ 1.5 mm	0.8 mm
Stem outside diameter	IN	7.975 ~ 7.990 mm	•••
	EX	7.960 ~ 7.975 mm	•••
Guide inside diameter	IN	8.000 ~ 8.012 mm	•••
	EX	8.000 ~ 8.012 mm	•••
Stem-to-guide clearance	IN	0.010 ~ 0.037 mm	0.08 mm
	EX	0.025 ~ 0.052 mm	0.10 mm

Item	Standard	Limit
Stem runout limit	•••	0.03 mm
		
Valve seat width IN	1.2 ~ 1.4 mm	2.0 mm
EX	1.2 ~ 1.4 mm	2.0 mm
Valve spring:		
Free length IN	44.6 mm	43.5 mm
EX	44.6 mm	43.5 mm
Set length (valve closed) IN	40 mm	•••
EX	40 mm	•••
Compressed pressure (installed) IN	160.7 N (16.4 kg)	•••
EX	160.7 N (16.4 kg)	•••
Tilt limit * IN	•••	2.5°/1.9 mm
EX	•••	2.5°/1.9 mm
		
Direction of winding		
(top view) IN	Clockwise	•••
EX	Clockwise	•••
Piston:		
Piston to cylinder clearance	0.025 ~ 0.050 mm	0.15 mm
Piston size “D”	94.960 ~ 94.975 mm	•••
		
Measuring point “H”	5 mm	•••
Piston off-set	0 mm	•••

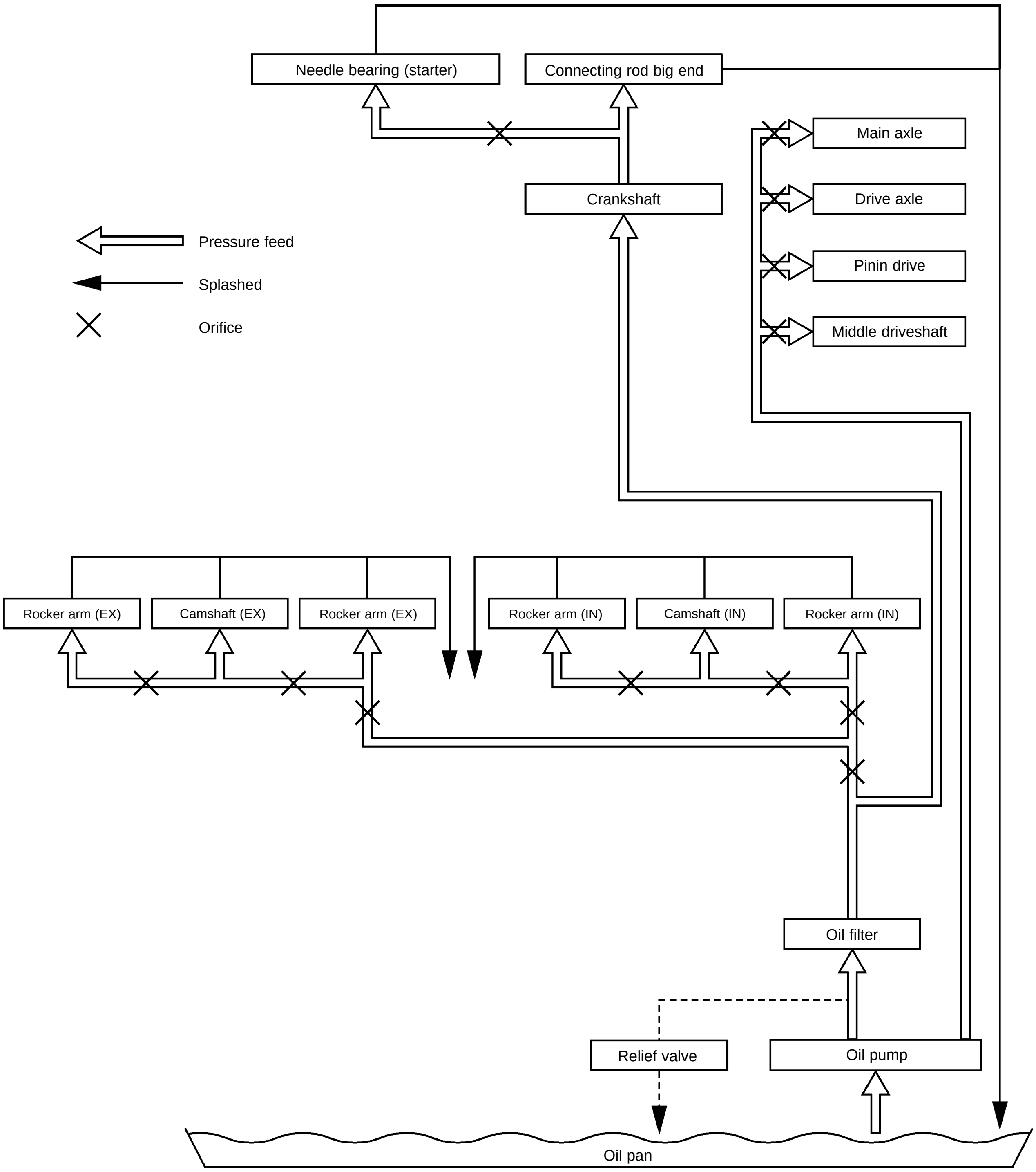
Item	Standard	Limit
Piston pin bore inside diameter	22.004 ~ 22.015 mm	22.045
Piston pin outside diameter	21.991 ~ 22.000 mm	21.975
Piston rings:		
Top ring:		
		
Type	Plain	•••
Dimensions (B x T)	1.5 × 3.8 mm	•••
End gap (installed)	0.3 ~ 0.5 mm	0.8 mm
Side clearance (installed)	0.04 ~ 0.08 mm	0.1 mm
2nd ring:		
		
Type	Taper	•••
Dimensions (B x T)	1.2 × 3.8 mm	•••
End gap (installed)	0.30 ~ 0.45 mm	0.8 mm
Side clearance	0.03 ~ 0.07 mm	0.1 mm
Oil ring:		
		
Dimensions (B x T)	2.5 × 3.4 mm	•••
End gap (installed)	0.2 ~ 0.7 mm	•••
Connecting rod:		
Oil clearance	0.044 ~ 0.073 mm	•••
Color code (corresponding size)	① Blue ② Black ③ Brown ④ Green ⑤ Yellow	•••
Crankshaft:		
		
Crank width “A”	101.95 ~ 102.00 mm	•••
Runout limit “C”	•••	0.02 mm
Big end side clearance “D”	0.320 ~ 0.474 mm	•••

Item		Standard	Limit
Clutch:			
Friction plate thickness		2.9 ~ 3.1 mm	2.8 mm
Quantity		8	•••
Clutch plate thickness		2.5 ~ 2.7 mm	0.1 mm
Quantity		1	•••
Clutch plate thickness		1.9 ~ 2.1 mm	0.1 mm
Quantity		7	•••
Clutch spring free length		7.2 mm	6.5 mm
Quantity		1	•••
Clutch housing thrust clearance		0.05 ~ 0.40 mm	•••
Clutch housing radial clearance		0.010 ~ 0.044 mm	•••
Clutch release method		Inner push, screw push	•••
Push rod bending limit		•••	0.5 mm
Transmission:			
Main axle deflection limit		•••	0.08 mm
Drive axle deflection limit		•••	0.08 mm
Shifter:			
Shifter type		Guide bar	•••
Carburetor:			
I. D. mark		5JN1 00	•••
Main jet	(M.J)	#125	•••
Main air jet	(M.A.J)	#55	•••
Jet needle	(J.N)	#5DL39-53-3	•••
Needle jet	(N.J)	P-0M (826)	•••
Pilot air jet	(P.A.J.1)	#63.8	•••
	(P.A.J.2)	#142.5	•••
Pilot outlet	(P.O)	1.0	•••
Pilot jet	(P.J)	#17.5	•••
Bypass 1	(B.P.1)	0.8	•••
Bypass 2	(B.P.2)	0.8	•••
Bypass 3	(B.P.3)	0.8	•••
Pilot screw	(P.S)	3.0	•••
Valve seat size	(V.S)	1.2	•••
Starter jet	(G.S.1)	#42.5	•••
Starter jet	(G.S.2)	0,9	•••
Throttle valve size	(TH.V)	#125	•••
Fuel level	(F.L)	4 ~ 5 mm	•••
Float height	(F.H)	11 ~ 12 mm	•••
Engine idle speed		950 ~ 1,050 r/min	•••
Intake vacuum		32.2 ~ 33.6 kPa (242 ~ 252 mmHg)	•••
Engine oil temperature		75 ~ 85 °C	•••
Fuel pump:			
Type		Electrical type	
Model/manufacturer		UC-Z6M/MITSUBISHI	•••
Consumption amperage	<max>	0.8 A	•••
Output pressure		12 kPa (0.12 kf/cm^2)	•••

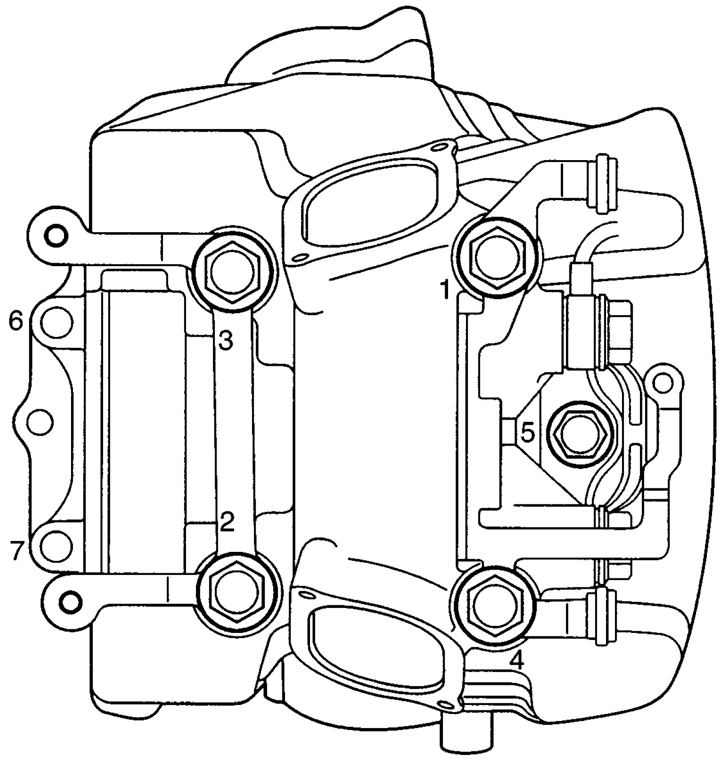
Item	Standard	Limit
Lubrication system:		
Oil filter type	Paper type	•••
Oil pump type	Trochoid type	•••
Tip clearance “A” or “B”	0.03 ~ 0.09 mm	0.15 mm
Side clearance	0.03 ~ 0.08 mm	0.15 mm
Relief valve operating pressure	450 ~ 550 kPa (4.5 ~ 5.5 kg/cm^2)	•••
Shaft drive:		
Middle gear backlash	0.1 ~ 0.2 mm	•••
Final gear backlash	0.1 ~ 0.2 mm	•••

Item	Standard

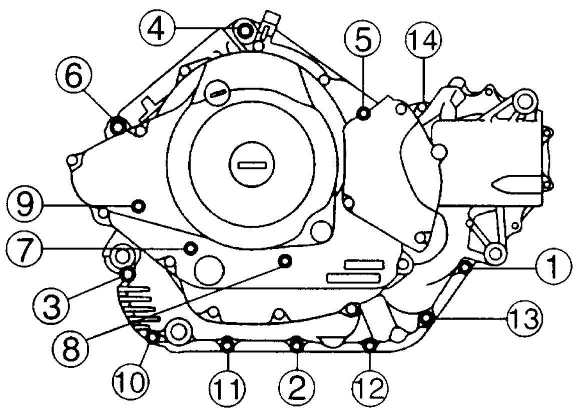
Lubrication chart:



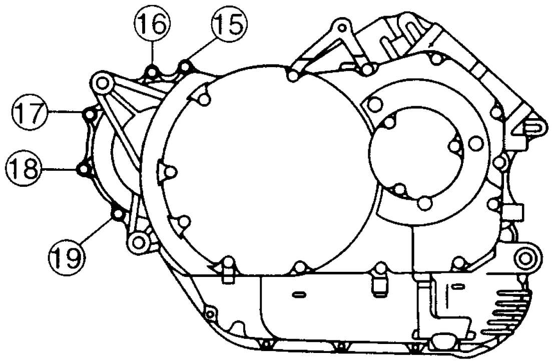
Cylinder head tightening sequence:



Crankcase tightening sequence:



Left crankcase



Right crankcase

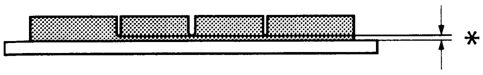
Tightening torques

Part to be tightened	Part name	Thread size	Q'ty	Tightening torque		Remarks
				N·m	m·kg	
Cylinder head	Nut	M12	8	50	5.0	
Cylinder head	Nut	M10	2	35	3.5	
Plate	Bolt	M8	2	20	2.0	
Cylinder head cover	Screw	M6	4	4	0.4	
Cylinder head (exhaust pipe)	Stud bolt	M8	4	12.5	1.25	
Rocker arm shaft	Union bolt	M16	2	37.5	3.75	
Camshaft sprocket cover	Bolt	M6	4	10	1.0	
Tappet cover	Bolt	M6	8	10	1.0	
Rocker arm shaft (oil passage)	Bolt	M16	4	38	3.8	
Stopper plate (camshaft)	Bolt	M8	4	20	2.0	Use lock washer
Spark plug	–	M14	2	20	2.0	
Cylinder	Bolt	M6	2	10	1.0	
Lower cylinder head cover	Bolt	M6	6	10	1.0	
Upper cylinder head cover	Screw	M6	8	5	0.5	
Connecting rod	Nut	M9	4	48	4.8	
Rotor	Nut	M16	1	175	17.5	
Valve adjusting locknut	Nut	M8	4	27	2.7	
Camshaft sprocket	Bolt	M10	2	55	5.5	
Timing chain tensioner	Bolt	M6	4	10	1.0	
Timing chain tentioner cap	Bolt	M6	2	8	0.8	
Timing chain guide	Bolt	M6	4	10	1.0	
Oil pump	Bolt	M6	3	10	1.0	
Oil strainer cover	Bolt	M6	3	10	1.0	
Oil filter cover	Bolt	M6	5	10	1.0	
Oil pump gear	Bolt	M6	1	12	1.2	
Oil pump cap	Bolt	M6	1	10	1.0	
Oil delivery pipe (cylinder head)	Union bolt	M16	2	20	2.0	
(crankcase)	Union bolt	M10	1	20	2.0	
Oil drain bolt	–	M14	1	43	4.3	
Air filter:						
Air filter cover fastener	Screw	M5	2	2	0.2	
Carburetor cover fastener	Screw	M5	4	4.5	0.45	
A.I.S. system:						
A.I.S. system fastener (pump and piping)	Screw	M6	4	10	1.0	
A.I.S. system pipe fastener to engine starter	Screw	M6	1	10	1.0	
A.I.S. pump fastener to A.I.S. bracket	Screw	M5	2	8	0.8	
Exhaust system:						
Cylinder head and exhaust pipe joint	Nut	M8	4	20	2.0	
Exhaust pipe bracket	Screw	M8	2	25	2.5	
Exhaust pipe/exhaust pipe guard fastener (rear)	Screw	M8	2	20	2.0	

Part to be tightened	Part name	Thread size	Q'ty	Tightening torque N·m	Tightening torque m·kg	Remarks
Exhaust pipe strap	Screw	M8	3	18	1.8	
Silencer fastener to passenger board support	Screw	M10	2	47	4.7	
Exhaust pipe guard fastener	Screw	M6	2	7	0.7	
Crankcase (cylinder)	Stud bolt	M12	8	24	2.4	
Crankcase (cylinder)	Stud bolt	M10	2	20	2.0	
Crankcase	Bolt	M10	3	38.5	3.85	
Crankcase	Bolt	M6	10	10	1.0	
Bearing retainer (middle drive pinion gear)	Bolt	M8	3	25	2.5	
Crankcase cover (left)	Bolt	M6	13	10	1.0	
Crankcase cover (right)	Bolt	M6	11	10	1.0	
Clamp	Bolt	M6	1	10	1.0	
One-way clutch	Bolt	M6	8	12	1.2	
Primary drive gear	Nut	M20	1	110	11.0	Use lock washer
Clutch spring	Bolt	M6	6	8	0.8	
Clutch adjuster	Nut	M8	1	12	1.2	
Clutch boss	Nut	M20	1	70	7.0	Use lock washer
Push lever axle	Screw	M8	1	12	1.2	
Middle drive pinion gear	Nut	M44	1	110	11.0	Stake
Bearing retainer (middle driven shaft)	Nut	M88	1	110	11.0	Stake
Yoke (middle driven shaft)	Nut	M14	1	–	–	Stake
Bearing housing (middle drive shaft)	Bolt	M8	4	25	2.5	
Shift lever stopper	Bolt	M8	1	22	2.2	 Use lock washer
Guide bar stopper	Screw	M6	2	7	0.7	
Shift dram segment	Screw	M5	1	4	0.4	
Shift arm	Bolt	M6	1	10	1.0	
Shift pedal adjuster	Nut	M6	2	10	1.0	1 of 2 has LH thread
Stator coil	Screw	M6	3	10	1.0	
Pickup coil	Screw	M5	2	7	0.7	
Starter motor	Bolt	M6	2	10	1.0	
Neutral switch	–	M10	1	20	2.0	
Ignition coil	Screw	M5	4	2.5	0.25	
Speed sensor	Bolt	M6	1	7	0.7	
Engine bracket:						
Rear fastener	Screw	M10	3	65	6.5	
Front fastener	Screw	M12	1	110	11.0	
Engine bracket fastener (front)	Special screw	M22	1	18	1.8	
Engine bracket fastener (front)	Nut	M12	4	85	8.5	

CHASSIS

Item		Standard	Limit
Steering system:			
Steering bearing type		Angular bearing	•••
Front suspension:			
Front fork travel		130 mm	•••
Fork spring free length		363.3 mm	•••
Fitting length		339.8 mm	•••
Collar length		150 mm	•••
Spring rate	(K1)	7.0 N/mm (0.71 kg/mm)	•••
	(K2)	11.2 N/mm (1.14 kg/mm)	•••
Stroke	(K1)	111 mm	•••
	(K2)	525 mm	•••
Optional spring		No	•••
Oil capacity		0.525 L	•••
Oil level		123 mm	•••
Oil grade		Fork oil 10W or equivalent	•••
Rear suspension:			
Shock absorber travel		60 mm	•••
Spring free length		175 mm	•••
Fitting length		162 mm	•••
Spring rate	(K1)	120 N/mm (12.23 kg/mm)	•••
Stroke	(K1)	0 ~ 60 mm	•••
Optional spring		No	•••
Swingarm:			
Free play limit	End	•••	0 mm
Front wheel:			
Type		Cast wheel	•••
Rim size		17 × MT3.50	•••
Rim material		Aluminium	•••
Rim runout limit	radial	•••	1.0 mm
	lateral	•••	0.5 mm
Rear wheel:			
Type		Cast wheel	•••
Rim size		17 × MT5.50	•••
Rim material		Aluminium	•••
Rim runout limit	radial	•••	1.0 mm
	lateral	•••	0.5 mm

Item		Standard	Limit
Front brake:			
Type		Dual disc	•••
Disc outside diameter × thickness		298 × 5 mm	4.5 mm
Disc deflection limit		•••	0.2 mm
Pad thickness	inner	5.5 mm	0.5 mm*
	outer	5.5 mm	0.5 mm*
			
Master cylinder inside diameter		14.0 mm	•••
Caliper cylinder inside diameter		30.2 mm	•••
Caliper cylinder inside diameter		27 mm	•••
Brake fluid type		DOT 4	•••
Rear brake:			
Type		Single disc	•••
Disc outside diameter × thickeness		267 × 5 mm	4.5 mm
Disc deflection limit		•••	0.15 mm
Pad thickness	inner	5.5 mm	0.5 mm
	outer	5.5 mm	0.5 mm
Master cylinder inside diameter		13 mm	•••
Caliper cylinder inside dimeter		42.85 mm	•••
Brake fluid type		DOT 4	
Brake pedal position		43 mm	•••
Clutch lever free play (at lever end)		5 ~ 10 mm	•••
Throttle grip free play		3 ~ 5 mm	•••

Tightening torques

Part to be tightened	Thread size	Tightening torque		Remarks
		N·m	m·kg	
Headlight assembly/Cowling:				
Lower headlight support	M6	10	1.0	
Upper headlight support (right and left)	M6	7	0.7	
Headlight bracket (right and left)	M6	10	1.0	
Plastic cover	M5	4	0.4	
Front flasher lights (right and left)	M12	10	1.0	
Handlebar/Front fork assembly:				
Upper bracket and inner tube	M8	25	2.5	
Lower bracket and inner tube	M8	25	2.5	
Front fork cap nut and steering shaft	M22	110	11.0	
Ring nut (steering shaft)	–	18	1.8	See “Note”
Meter bracket and upper bracket	M6	10	1.0	
Handlebar holder (lower) and upper bracket	M10	32	3.2	
Handlebar holder (lower) and handlebar (upper)	M8	23	2.3	
Throttle cable	M5	4.5	0.45	
Clutch lever assembly	M6	11	1.1	
Handlebar weight (right and left)	M8	23	2.3	
Front fender fastening screw	M6	7	0.7	
Front wheel:				
Front brake caliper (right and left)	M10	42	4.2	
Front brake disc (right and left)	M8	25	2.5	
Front wheel axle	M18	75	7.5	
Front wheel axle pinch bolt	M8	25	2.5	
Rear wheel:				
Rear brake disc	M8	25	2.5	
Rear brake caliper	M10	35	3.5	
Rear wheel axle nut	M16	110	11.0	
Rear wheel axle pinch bolt	M8	22	2.2	
Dust cover fastening screw	M5	4.5	0.45	
Swingarm assembly:				
Pivot shaft	M16	92	9.2	
Swingarm pinch bolt	M8	22	2.2	
Shock absorber fastener (upper)	M10	42	4.2	
Shock absorber fastener (lower)	M10	50	5.0	
Connecting arm	M12	50	5.0	
Relay arm	M10	50	5.0	
Final gear case fastening cap nut	M10	50	5.0	
Sidestand/Shift pedal:				
Sidestand	M8	19	1.9	
Sidestand switch	M5	4.5	0.45	
Shift rod	M6	7	0.7	
Ball-and-joint socket	M6	8	0.8	
Shift boss	M6	7	0.7	
Shift pedal	M8	16	1.6	
Front brake:				
Brake hose union bolt	M10	28	2.8	
Front master cylinder	M6	10	1.0	
Front master cylinder cover	–	2	0.2	
Front brake joint fastening screw	M6	10	1.0	
Brake hose holder fastening screw	M6	10	1.0	

Part to be tightened	Thread size	Tightening torque		Remarks
		N·m	m·kg	
Rear brake/Footrests:				
Brake caliper torque rod	M8	25	2.5	
Rear brake adjuster	M6	10	1.0	
Rear brake pedal fastening screw (special)	M8	16	1.6	
Rear master cylinder fastening screw	M6	10	1.0	
Rear brake fluid reservoir fastening screw	M6	7	0.7	
Special screw for fastening rear brake hose to brake caliper	M10	28	2.8	
Special screw for fastening rear brake hose to master cylinder	M10	24	2.4	
Brake caliper bleed screw	M6	6	0.6	
Front footrest bracket fastening screw (aluminium)	M10	55	5.5	
Front footrest bracket fastening screw (steel)	M8	23	2.3	
Footrest damper fastening screw	M5	4	0.4	
Rear footrest fastening screw	M6	7	0.7	
Rear footrest bracket fastening screw	M8	23	2.3	
Rear lights/Rear fender/Panel assembly:				
Side panel fastening screw	M6	7	0.7	
Battery receptacle fastening screws	M6	7	0.7	
Battery receptacle cover fastening screws	M6	7	0.7	
Plastic rear fender fastening screws	M6	7	0.7	
Plastic license bracket fastening screws	M6	7	0.7	
Rear fender cover fastening screw (aluminium)	M8	23	2.3	
Seat lock fastening screw	M6	7	0.7	
Rear flasher lights (right and left)	M12	10	1.0	
Tail light fastening screw	M6	7	0.7	
Fuel tank:				
Fastening screw (front)	M6	10	1.0	
Fastening screw (rear)	M6	10	1.0	
Bracket fastening screw (rear)	M6	7	0.7	
Tank cap fastening screw	M5	6	0.6	
Tank cover fastening screw (aluminium)	M5	4	0.4	
Fuel cock fastening screw	M6	7	0.7	
Fuel sender fastening screw	M6	7	0.7	

NOTE:

1. First, tighten the ring nut approximately 52 Nm (5.2 m·kg) by using the torque wrench, then loosen the ring nut completely.
2. Retighten the ring nut to specification.

ELECTRICAL

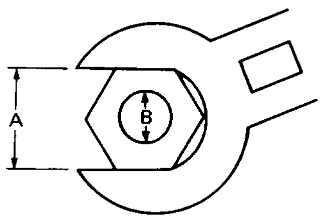
Item	Standard	Limit
Voltage:	12 V	•••
Ignition system:		
Ignition timing (B.T.D.C.)	10° at 1,000 r/min	•••
Advancer type	Digital type	•••
T.C.I.:		
Pickup coil resistance/color	189 ~ 231 Ω at 20 °C / Gray–Black	•••
T.C.I. unit model/manufacturer	J4T101/MITSUBISHI	•••
Ignition coil:		
Model/manufacturer	F6T507/MITSUBISHI	•••
Primary winding resistance	3.57 ~ 4.83 Ω at 20 °C	•••
Secondary winding resistance	10.7 ~ 14.5 kΩ at 20 °C	•••
Spark plug cap:		
Type	Resin type	•••
Resistance	10 kΩ	•••
Charging system:		
Type	A.C. magneto	•••
Model/manufacturer	F4T654/MITSUBISHI	•••
Nominal output	14V 350W at 5,000 r/min	•••
Stator coil resistance/color	0.36 ~ 0.44 Ω at 20 °C / White–White	•••
Voltage regulator:		
Type	Semi-conductor, short-circuit type	•••
Model/manufacturer	SH650D-11/SHINDENGEN	•••
No load regulated voltage	14.1 ~ 14.9 V	•••
Rectifier:		
Model/manufacturer	SH650D-11/SHINDENGEN	•••
Capacity	18 A	•••
Withstand voltage	200 V	•••
Battery:		
Specific gravity	1.320	•••
Electric starter system:		
Type	Constant mesh type	•••
Starter motor:		
Model/manufacturer	SM-13/MITSUBA	•••
Output	0.6 kW	•••
Armature coil resistance	0.026 ~ 0.034 Ω at 20 °C	•••
Brush overall length	10 mm	5 mm
Brush spring pressure	7.65 ~ 10,01 N (780 ~ 1021 g)	•••
Commutator diameter	28 mm	27 mm
Mica undercut	0.7 mm	•••
Starter relay:		
Model/manufacturer	MS5F-421/JIDECO	•••
Amperage rating	180 A	•••

Item	Standard	Limit
Horn:		
Type	Plane type	•••
Quantity	1	•••
Model/manufacturer	K80 L-12V/LEB	•••
Maximum amperage	3 A	•••
Flasher relay:		
Type	Semi-transistor	•••
Model/manufacturer	FB222M/NIPPONDENSO	•••
Self cancelling device	No	•••
Flasher frequency	75 ~ 95 cycle/min	•••
Wattage	10 W × 2 + 3.4 W	•••
Oil level gauge:		
Model/manufacturer	5EL/DENSO	•••
Starting circuit cut-off relay:		
Model/manufacturer	G8R-30Y-B/OMRON	•••
Fuel pump relay:		
Model/manufacturer	G8R-30Y-B/OMRON	•••
Circuit breaker:		
Type	Fuse	
Amperage for individual circuit:		
Main	30 A × 1	
Back up	5 A × 1	
Ignition	10 A × 1	
Headlight	15 A × 1	
Carburetor heater	15 A × 1	
Signals	10 A × 1	

EB202001

GENERAL TORQUE SPECIFICATIONS

This chart specifies torque for standard fasteners with standard I.S.O. pitch threads. Torque specifications for special components or assemblies are provided for each chapter of this manual. To avoid warpage, tighten multi-fastener assemblies in a crisscross fashion, in progressive stages, until the specified torque is reached. Unless otherwise specified, torque specifications require clean, dry threads. Components should be at room temperature.



A: Distance between flats
B: Outside thread diameter

A (nut)	B (Bolt)	General torque specifications	
		N·m	m·kg
10 mm	6 mm	6	0.6
12 mm	8 mm	15	1.5
14 mm	10 mm	30	3.0
17 mm	12 mm	55	5.5
19 mm	14 mm	85	8.5
22 mm	16 mm	130	13.0

EAS00028

CONVERSION TABLE

All specification data in this manual are listed in SI and METRIC UNITS. Use this table to convert METRIC unit data to IMPERIAL unit data.

Ex.

METRIC		MULTIPLIER		IMP
** mm	×	0.03937	=	** in.
2 mm	×	0.03937	=	0.08 in.

CONVERSION TABLE

METRIC TO IMP			
	Known	Multiplier	Result
Torque	m·kg m·kg cm·kg cm·kg	7.233 86.794 0.0723 0.8679	ft·lb in·lb ft·lb in·lb
Weight	kg g	2.205 0.03527	lb oz
Distance	km/hr km m m cm mm	0.6214 0.6214 3.281 1.094 0.3937 0.03937	mph mi ft yd in in
Volume/ Capacity	cc (cm^3) cc (cm^3) lt (liter) lt (liter)	0.03527 0.06102 0.8799 0.2199	oz (IMP liq.) cu·in qt (IMP liq.) gal (IMP liq.)
Miscel-laneous	kg/mm kg/cm^2 Centigrade	55.997 14.2234 9/5 (°C) + 32	lb/in psi (lb/in^2) Fahrenheit (°F)

EB203000

LUBRICATION POINTS AND LUBRICANT TYPES

ENGINE

Lubrication point	Symbol
Oil seal lips	LS
O-ring	LS
Bearing	E
Connecting rod bolt/nut	M
Connecting rod small end and big end	E
Crankshaft pin	E
Crankshaft journal/big end	E
Piston surface	E
Piston pin	E
Camshaft cam lobe/journal	M
Rocker arm shaft	E
Valve stem (IN, EX)	M
Valve stem end (IN, EX)	E
Timing chain drive gear shafts/sprokets	E
Oil pump rotor (inner/outer), housing	E
Idle gear surface	E
Starter idle gear	E
Starter idle gear shaft	E
Starter oneway cam	E
Middle drive gear	E
Primary driven gear	E
Push rod 1, 2	M
Transmission gear (wheel/pinion)	E
Shift cam	E
Shift fork/guide bar	E
Shift shaft assembly	E
Push rod ball	LS
Push lever assembly	LS

EB203010

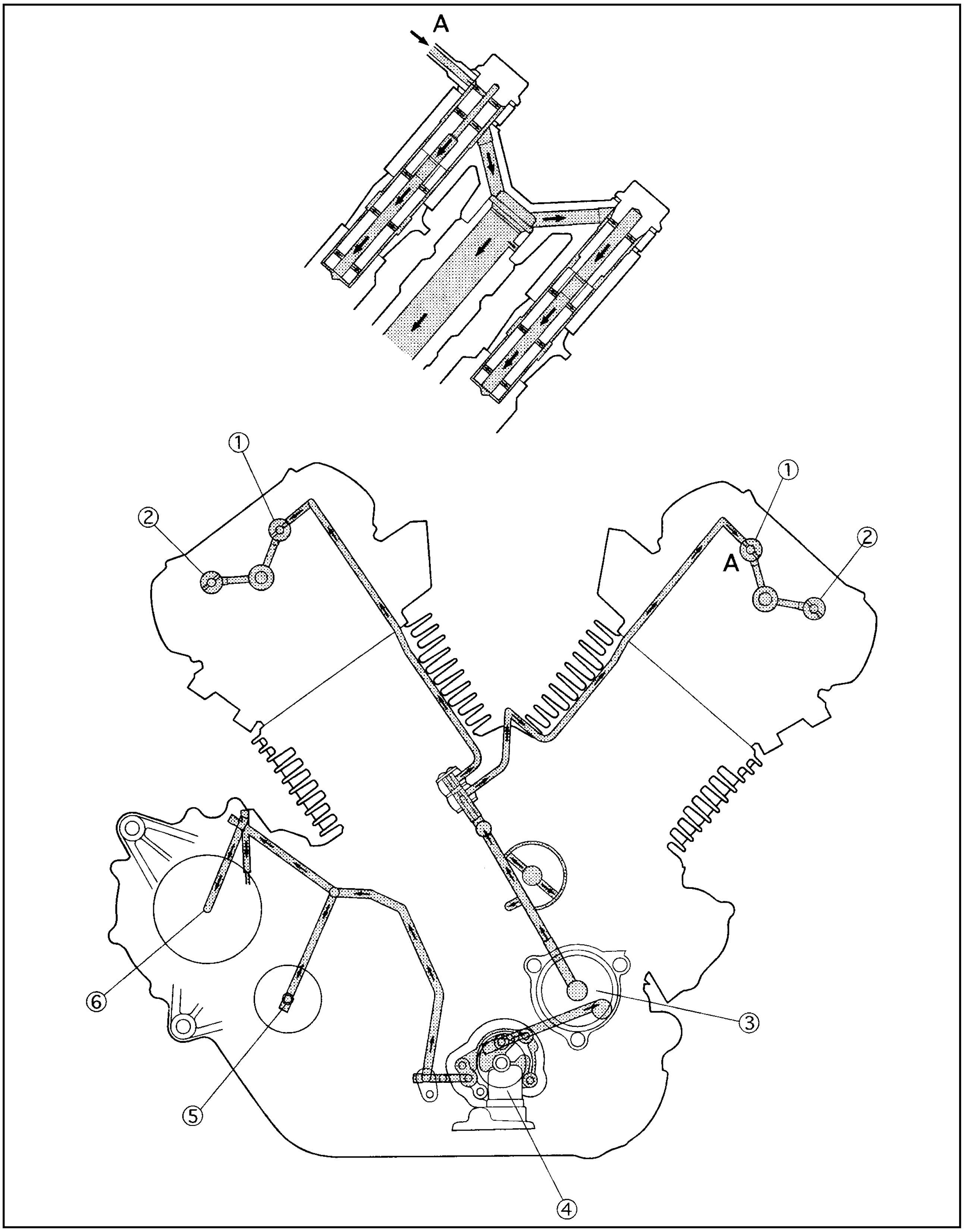
CHASSIS

Lubrication point	Symbol
Steering head pipe (upper/lower), bearing	LS
Steering head pipe, bearing cover lip	LS
Steering head pipe, oil seal lip	LS
Front wheel oil seal lip (right/left)	LS
Rear wheel oil seal lip	LS
Clutch hub fitting area	LS
Rear brake pedal shaft	LS
Shift pedal shaft	LS
Sidestand bolt, sidestand sliding surface	LS
Tube guide (throttle grip) inner surface	LS
Brake lever pivot bolt, contact surface	LS
Clutch lever pivot bolt, contact surface	LS
Rear shock absorber (lower) oil seal lip	M
Swingarm pivot bearing inner surface	M
Swingarm pivot oil seal lip	M
Relay arm bearing, collar and oil seal	M
Drive shaft spline	M
Drive shaft dust cover	LS
Drive shaft coupling gear oil seal	LS

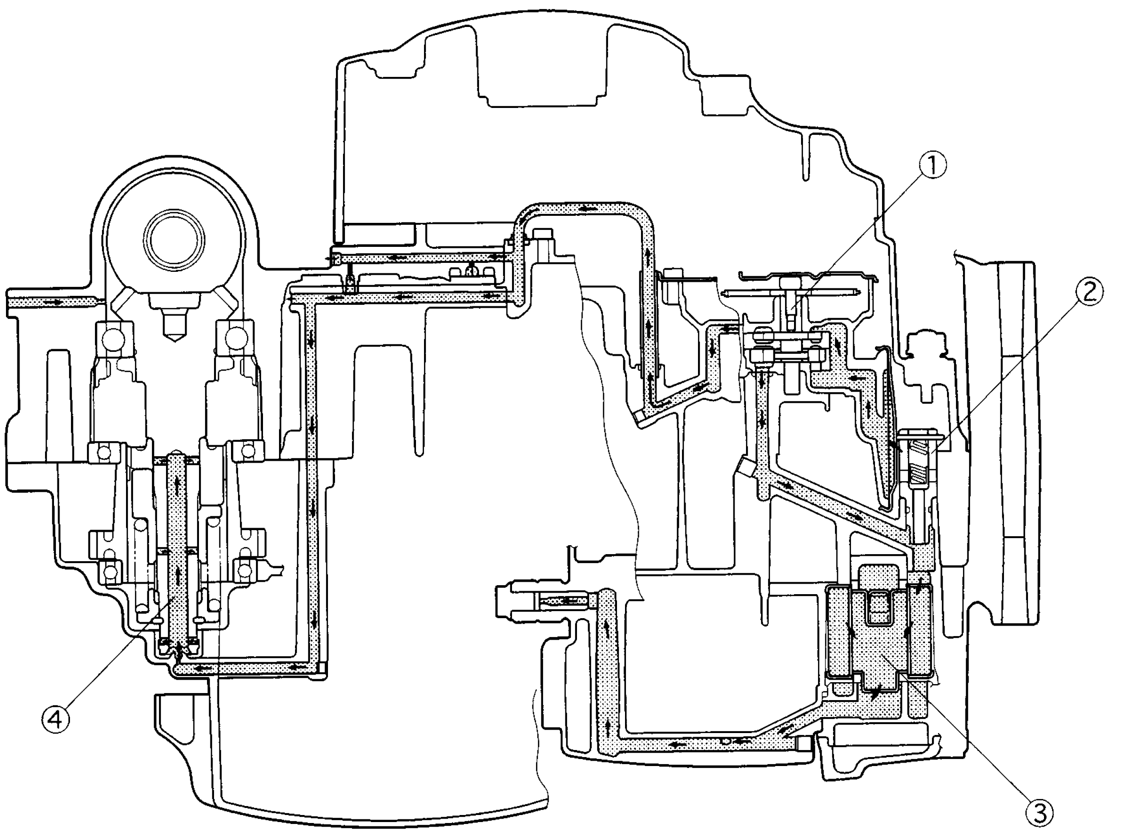
EB205000

LUBRICATION DIAGRAMS

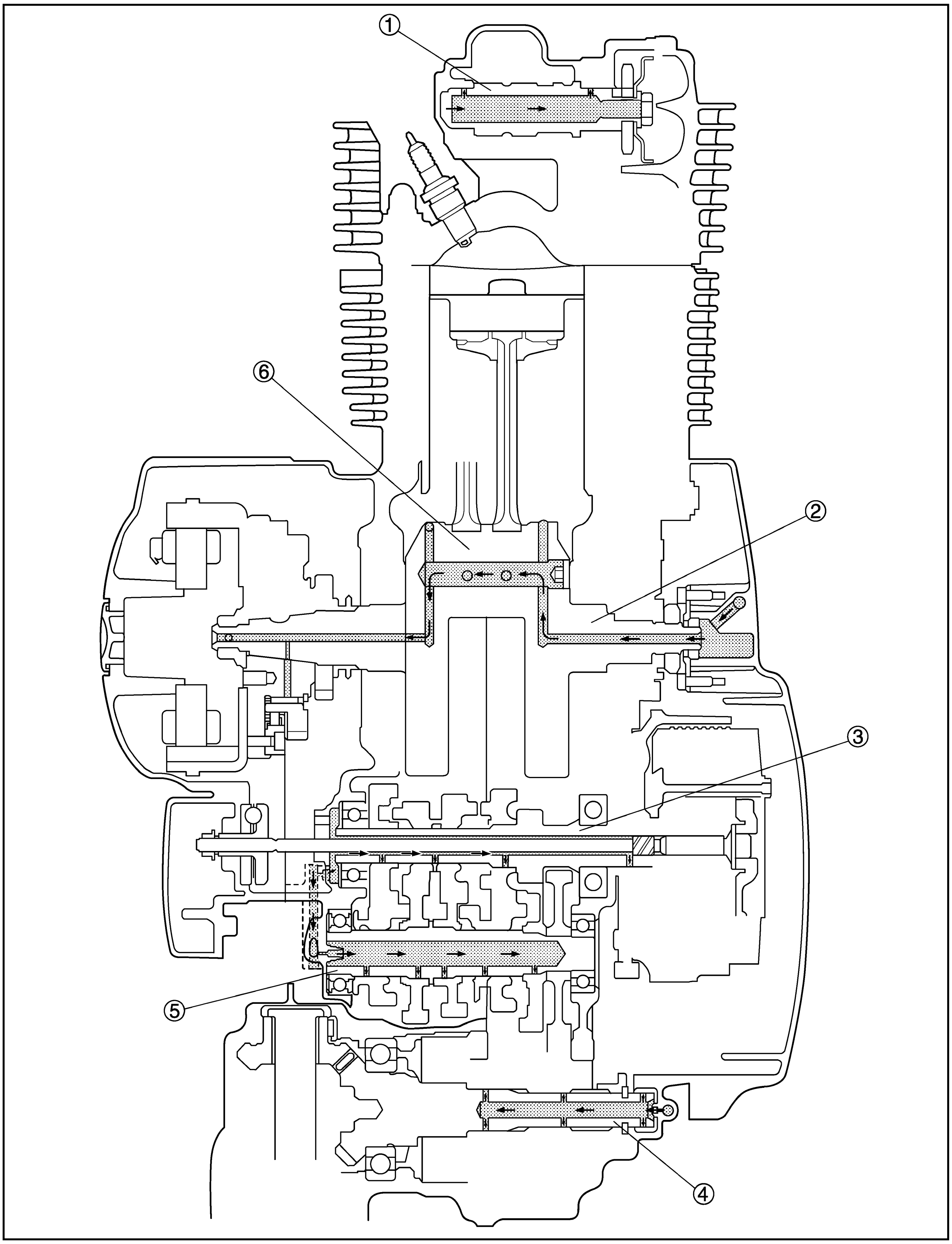
① Rocker arm shaft (intake)
② Rocker arm shaft (exhaust)
③ Oil filter
④ Oil pump
⑤ Drive axle
⑥ Middle drive shaft



① Oil pump
② Releaf valve
③ Oil filter
④ Middle drive shaft



① Camshaft
② Crankshaft
③ Main axle
④ Middle drive shaft
⑤ Drive axle
⑥ Connecting rod big end

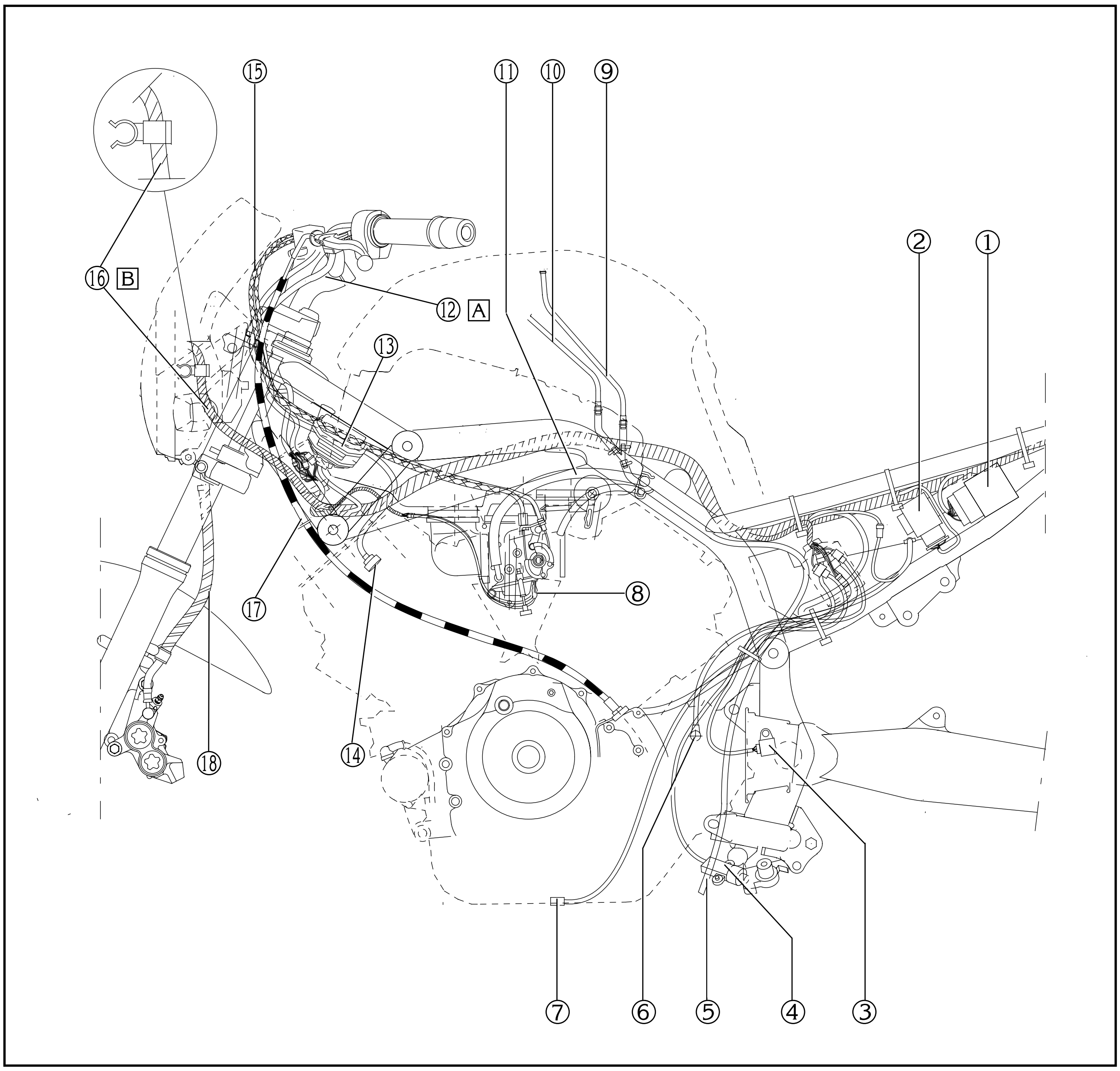


EB206000
CABLE ROUTING

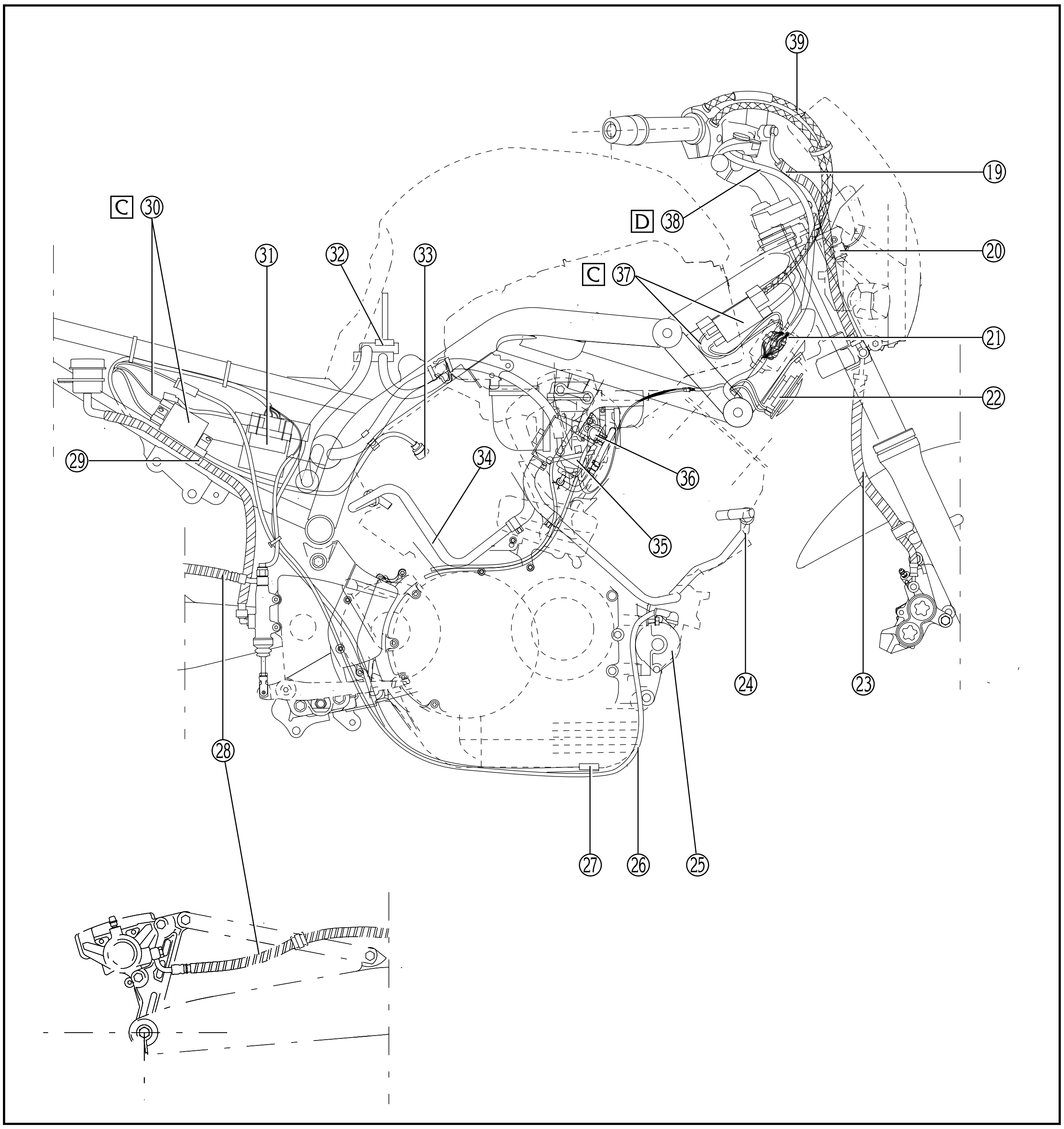
① Relays group
② Flasher relay
③ Speed sensor
④ Sidestand switch
⑤ Fuel drain hose
⑥ Engine earth
⑦ Neutral switch
⑧ Carburetor heater
⑨ Filler tank cap fuel drain pipe
⑩ Filler tank cap fuel drain pipe
⑪ Fuel hose (carburetor-3 way)
⑫ Handlebar switch leads (left)
⑬ Rectifier/regulator
⑭ Spark plug cap (front cilinder)
⑮ Throttle cables
⑯ Wireharness
⑰ Clutch cable
⑱ Front brake cable (left)

[A] Fix the wires of the left swicth assy to the handlebar by means of no. 2 plastic clamps.

[B] Fix the headlight leads to the clamp.



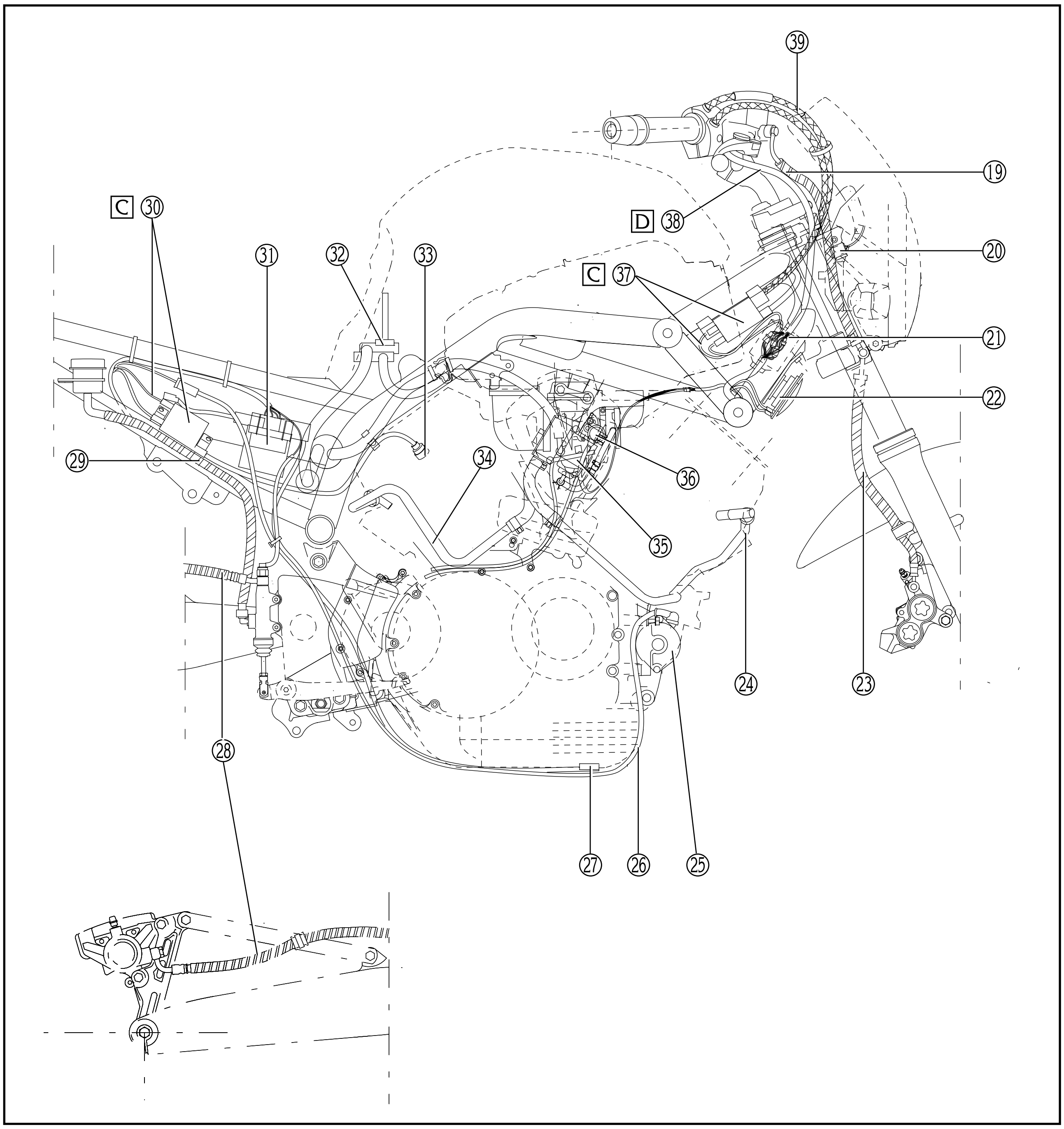
⑲ Brake cable (front master cylinder)
⑳ Thermo swicth
㉑ Rubber cap for front wiring connections
㉒ Horn
㉓ Front brake hose (right)
㉔ A.I.S. pipe to the front cylinder
㉕ Starter motor
㉖ Starter motor lead
㉗ Oil level gauge
㉘ Rear brake hose
㉙ Brake fluid reservoir hose
㉚ Ignition coil (rear cylinder)
㉛ Starter relay assy
㉜ Depression fuel cock



㉝ Spark plug cap (rear cylinder)
㉞ A.I.S. pipe to the rear cylinder
㉟ A.I.S. system
㊱ Throttle position sensor (TPS)
㊲ Ignition coil (front cylinder)
㊳ Handlebar switch leads (right)
㊴ Throttle cables

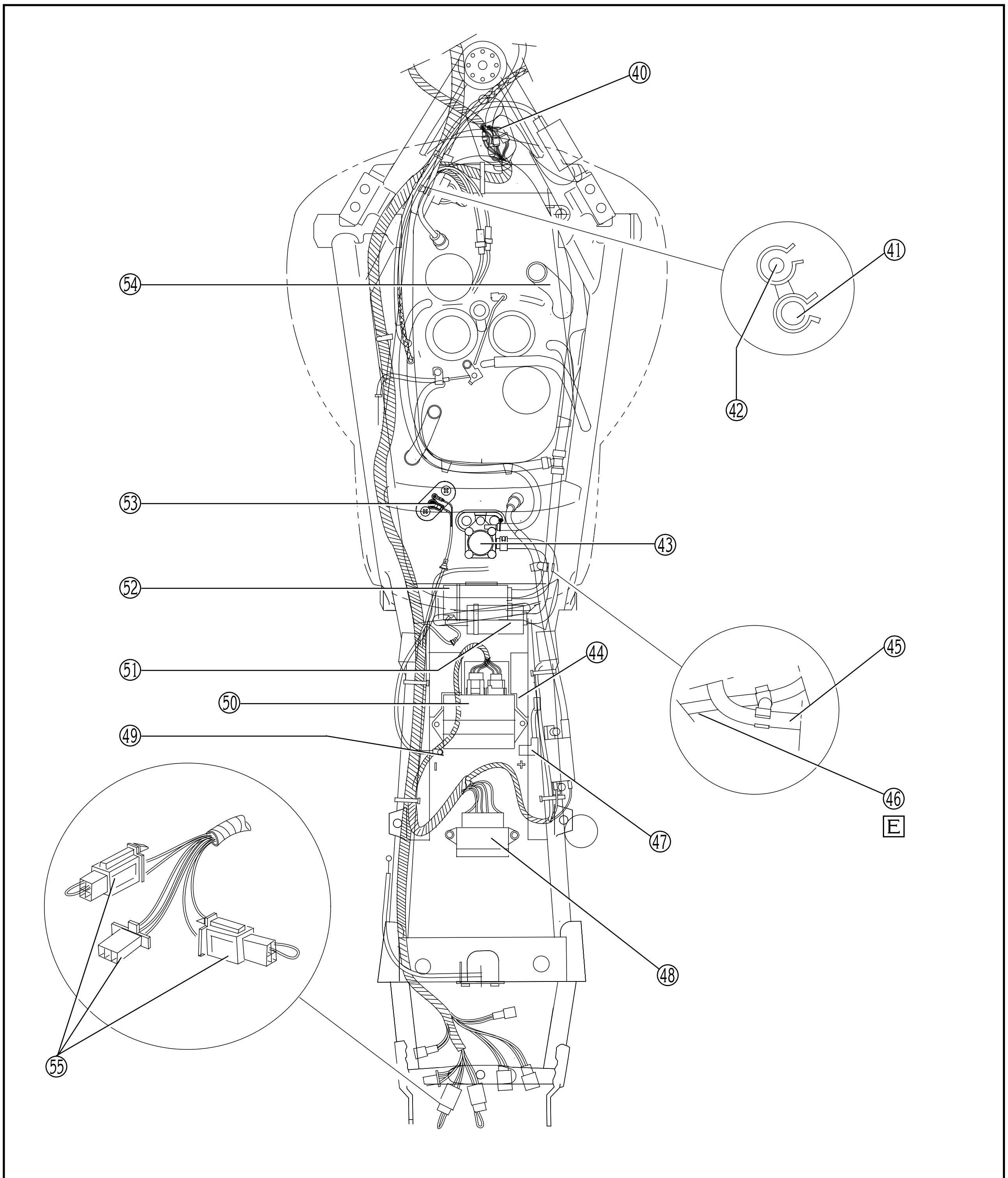
C Check that the wires of the ignition coil do not remain tensioned.

D Fix the wires of the right switch assy to the handlebar by means of no. 1 plastic clamp.



㊵ Rubber cap for front wiring connections
㊶ Spark plug lead (front)
㊷ Throttle cable
㊸ Depression fuel cock
㊹ Battery
㊺ Fuel hose
㊻ Spark plug lead (rear)
㊼ Battery positive (+) terminal
㊽ Fuse box
㊾ Battery negative (-) terminal
㊿ Igniter unit
51 Fuel filter
52 Fuel pump
53 Fuel sender
54 Air intake pipe (A.I.S. system)
55 Anti-theft alarm connectors

E Position the spark plug wire of the rear cylinder below the fuel hose.



INSP
ADJ

3

CHAPTER 3.
PERIODIC INSPECTIONS AND ADJUSTMENTS

EB300000

PERIODIC INSPECTIONS AND ADJUSTMENTS

INTRODUCTION

This chapter includes all information necessary to perform recommended inspections and adjustments. These preventive maintenance procedures, if followed, will ensure more reliable vehicle operation and a longer service life. The need for costly overhaul work will be greatly reduced. This information applies to vehicles already in service as well as to new vehicles that are being prepared for sale. All service technicians should be familiar with this entire chapter.

PERIODIC MAINTENANCE/LUBRICATION INTERVALS

N0.		ITEM	CHECK OR MAINTENANCE JOB	ODOMETER READING (x 1,000 km)					Annual check
				1	10	20	30	40	
1	*	**Fuel line**	• Check fuel hoses and vacuum hose for cracks or damage.		✓	✓	✓	✓	✓
2	*	**Fuel filter**	• Check condition.			✓		✓	
3		**Spurk plugs**	• Check condition. • Clean and regap.		✓		✓		
			• Replace.			✓		✓	
4	*	**Valves**	• Check valve clearance. • Adjust.		✓	✓	✓	✓	
5		**Air filter element**	• Clean.		✓		✓		
			• Replace.			✓		✓	
6		**Clutch**	• Check operation. • Adjust.	✓	✓	✓	✓	✓	
7	*	**Front brake**	• Check operation,fluid level and vehicle for fluid leakeage. (See NOTE)	✓	✓	✓	✓	✓	✓
			• Replace brake pads.	Whenever worm to the limit					
8	*	**Rear brake**	• Check operation, fluid level and vehicle for fluid leakage. (See NOTE)	✓	✓	✓	✓	✓	✓
			• Replace brake pads.	Whenever worm to the limit					
9	*	**Brake hoses**	• Check for cracks or damage.		✓	✓	✓	✓	✓
			• Replace. (See NOTE)	Every 4 years					
10	*	**Wheels**	• Check runout and for damage.		✓	✓	✓	✓	
11	*	**Tires**	• Check tread depth and for damage. • Replace if necessary. • Check air pressure. • Correct if necessary.		✓	✓	✓	✓	
12	*	**Wheel bearings**	• Check bearing for looseness or damage.		✓	✓	✓	✓	
13	*	**Swingarm**	• Check operation and for excessive play.		✓	✓	✓	✓	
			• Lubrificate with lithium-soap-based grease.	Every 50,000 km					
14	*	**Steering bearings**	• Check bearing play and steering for roughness.	✓	✓	✓	✓	✓	
			• Lubrificate with lithium-soap-based grease.	Every 20,000 km					
15	*	**Chassis fasteners**	• Make sure that all nuts, bolts and screws are properly tightened.		✓	✓	✓	✓	✓
16		**Sidestand**	• Check operation. • Lubricate.		✓	✓	✓	✓	✓
17	*	**Sidestand switch**	• Check operation and for oil leakage.	✓	✓	✓	✓	✓	✓
18	*	**Front fork**	• Check operation and for oil leakage.		✓	✓	✓	✓	

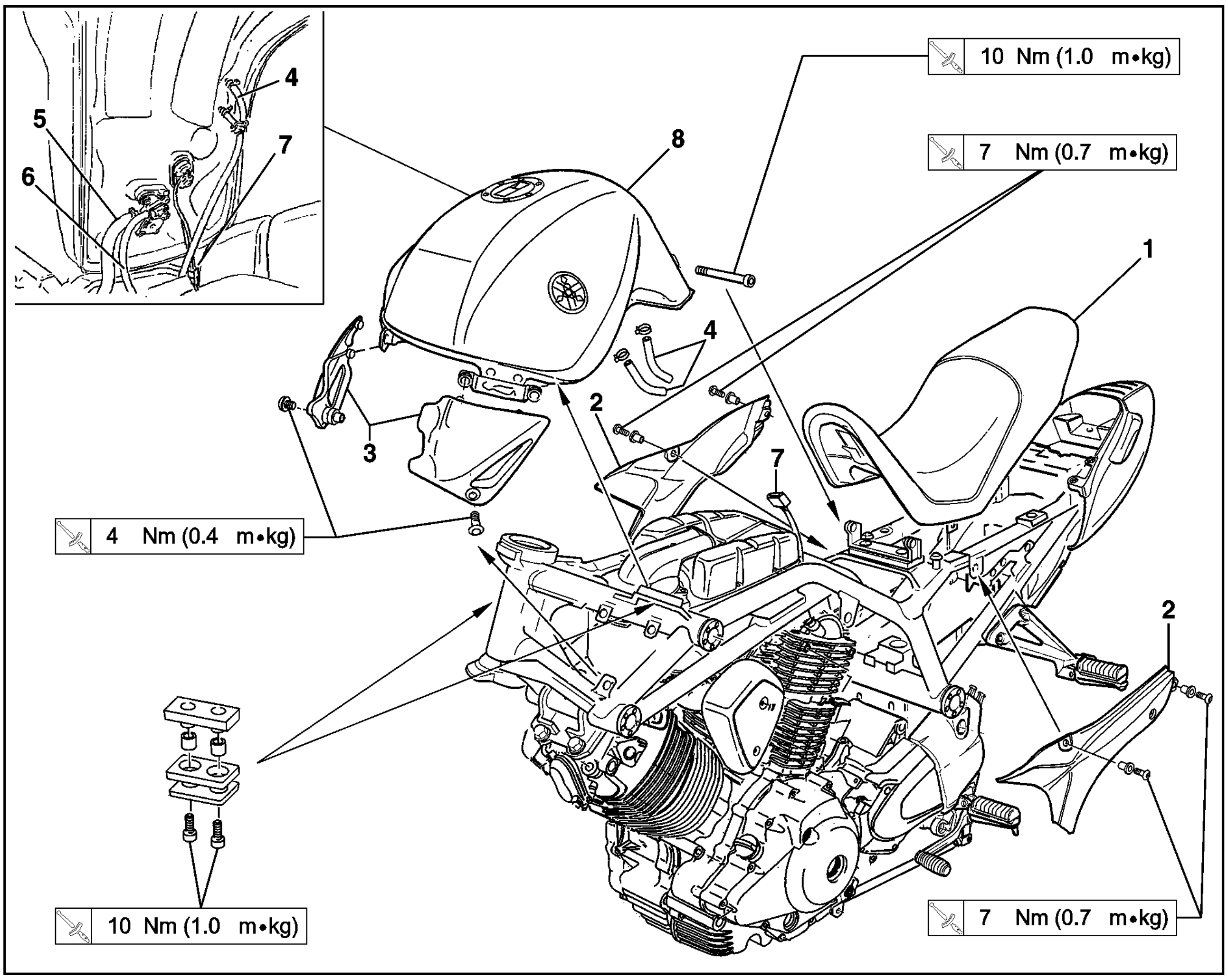
N0.		ITEM	CHECK OR MAINTENANCE JOB	ODOMETER READING (x 1,000 km)					Annual check
				1	10	20	30	40	
19	*	Rear shock absorber assembly	• Check operation and shock absorber for oil leakage.		✓	✓	✓	✓	
20	*	Rear suspension relay arm and connecting arm pivoting points	• Check operation.		✓	✓	✓	✓	
			• Lubricate with lithium-soap-based grease.			✓		✓	
21	*	Carburators	• Check starter (choke) operation. • Adjust engine idling speed and synchronization.	✓	✓	✓	✓	✓	✓
22		Engine oil	• Change.	✓	✓	✓	✓	✓	✓
23		Engine oil filter element	• Replace.	✓		✓		✓	
24		Final gear oil	• Check oil level and vehicle for oil leakage.	✓	✓		✓		
			• Change.	✓		✓		✓	
25		Moving parts and cables	• Lubricate.		✓	✓	✓	✓	✓
26	*	Air induction system	• Check the air cut valve and reed valve for damage. • Replace the entire air induction system if necessary.		✓	✓	✓	✓	✓
27	*	Lights, signals and switches	• Check operation. • Adjust headlight beam.	✓	✓	✓	✓	✓	✓

* Items marked with an asterisk should be performed by a Yamaha dealer as they require special tools, data and technical skills.

NOTE:

- The annual checks must be performed every year, except if a kilometer-based maintenance is performed instead.
- From 50,000 km, repeat the maintenance intervals starting from 10,000 km.
- The air filter needs more frequent service if you are riding in unusually wet or dusty areas.
- Hydraulic brake system:
  - Check the brake fluid level regularly and fill as required.
  - Replace the oil seals on the inner parts of the master cylinder and caliper cylinder every two years.
  - Replace the brake hoses every four years or if cracked or damaged.

SEAT, SIDE COVERS AND FUEL TANK



Order	Job name/Part name	Q'ty	Remarks
	Seat, side covers and fuel tank removal		Remove the parts in the order below.
1	Seat	1	
2	Side cover	2	
3	Panel	2	
4	Fuel overflow pipe	2	
5	Fuel hose	1	
6	Fuel hose	1	
7	Fuel meter sender unit couper	1	
8	Fuel tank assembly	1	
			For installation, reverse the removal procedure.

EASB0045

ENGINE

ADJUSTING THE VALVE CLEARANCE

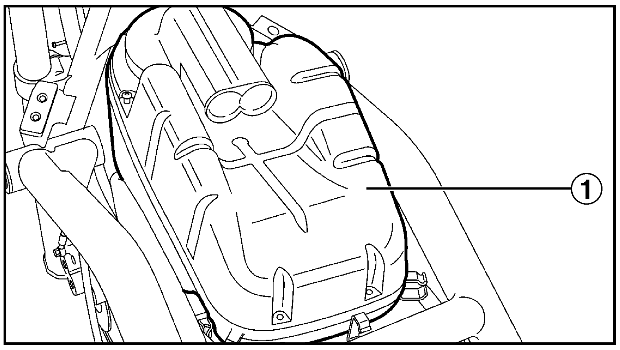
The following procedure applies to all of the valves.

NOTE:

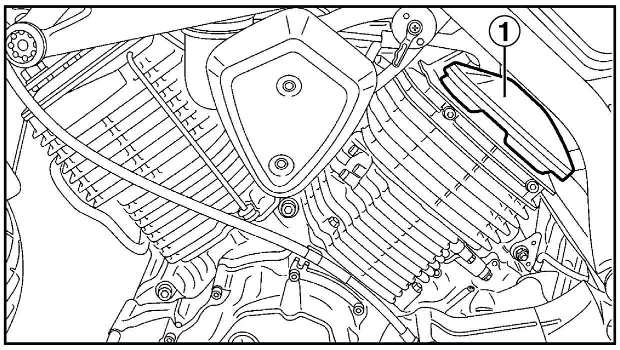
- Valve clearance adjustment should be made on a cold engine, at room temperature.
- When the valve clearance is to be measured or adjusted, the piston must be at top dead center (TDC) on the compression stroke.

1. Remove:
   - seat
   - fuel tank

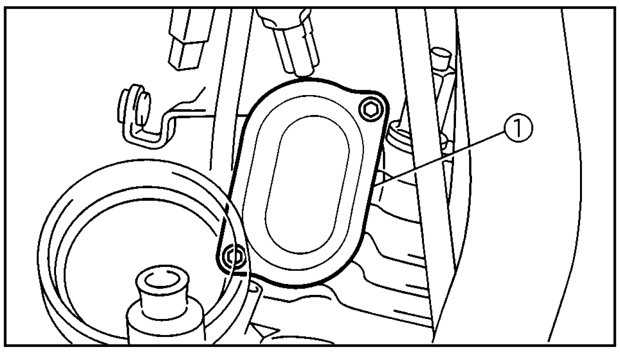
   Refer to "SEAT, SIDE COVERS AND FUEL TANK".
2. Disconnect:
   - spark plug caps
3. Remove:
   - spark plugs
4. Remove:
   - air intake box ①

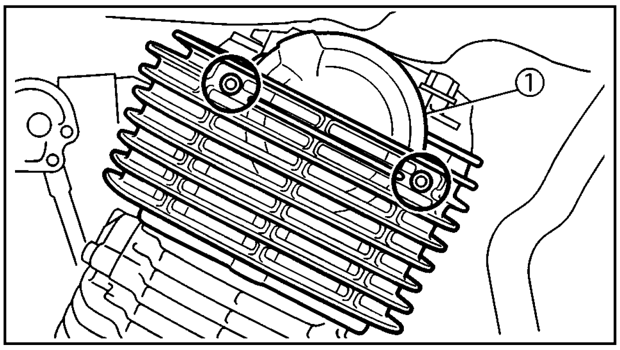


5. Remove:
   - cylinder head cover (rear cylinder) ①
   - cylinder head cover (front cylinder)

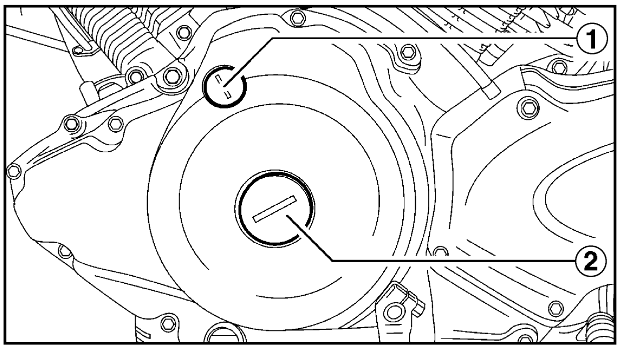


6. Remove:
   - tappet covers ①





7. Remove:
   - camshaft sprocket cover (rear cylinder) ①
   - camshaft sprocket cover (front cylinder)

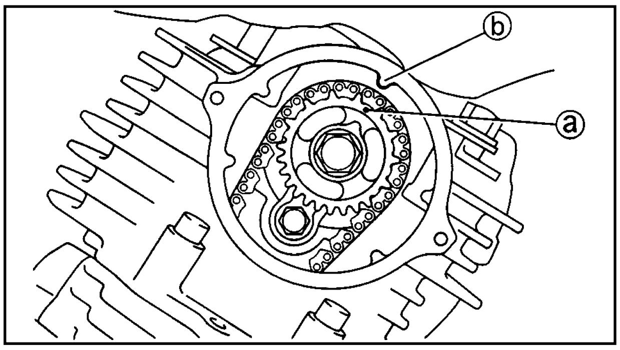


8. Remove:
   - timing plug ①
   - straight plug ②

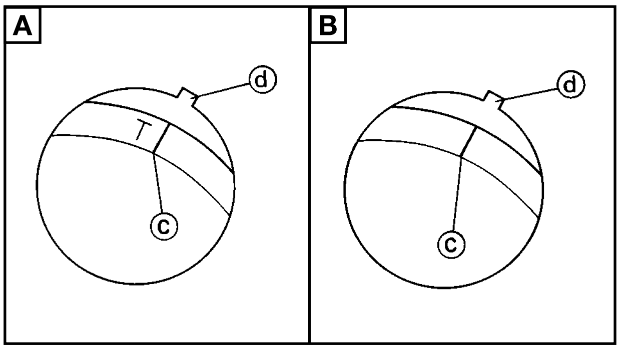
9. Measure:
   - valve clearance
     Out of specification → Adjust.

Valve clearance (cold):
Intake valve:
0.07 ~ 0.12 mm
Exhaust valve:
0.12 ~ 0.17 mm

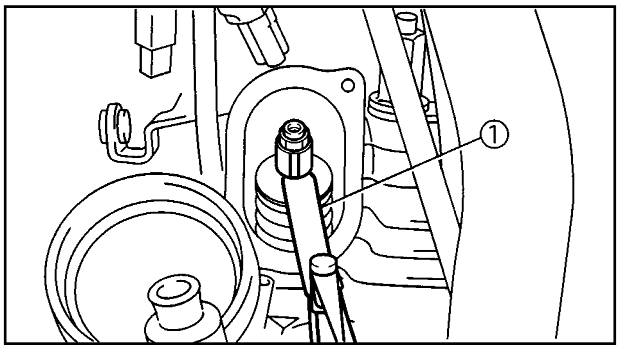
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a. Turn the crankshaft counterclockwise.
b. When the piston is at TDC on the compression stroke, align either the camshaft sprocket plate hole ⓐ with the stationary pointer ⓑ on the cylinder head. When the camshaft sprocket plate hole or camshaft sprocket punch mark is aligned with the stationary pointer, the piston is at top dead center (TDC).
c. Align the TDC mark ⓒ on the generator rotor with the stationary pointer ⓓ on the crankcase.

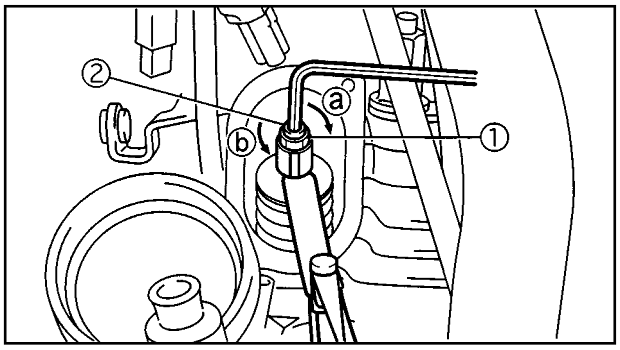


[A] Rear cylinder ("TI" mark)
[B] Front cylinder ("I" mark)



d. Measure the valve clearance with a thickness gauge ①.
e. Turn the crankshaft crockwise 290° and then measure the front cylinder.

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10. Adjust:
    - valve clearance

▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼

a. Loosen the locknut ①.
b. Insert a thickness gauge between the end of the adjusting screw and the valve tip.
c. Turn the adjusting screw ② in direction ⓐ or ⓑ until the specified valve clearance is obtained.

Direction ⓐ	**Valve clearance is decreased.**
Direction ⓑ	**Valve clearance is increased.**

d. Hold the adjusting screw to prevent it from moving and tighten the locknut to specification.

Locknut:
27 Nm (2.7 m•kg)

e. Measure the valve clearance again.
f. If the valve clearance is still out of specification, repeat all of the valve clearance adjustment steps until the specified clearance is obtained.

▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲

11. Install:
    - all removed parts

NOTE:
Install all removed parts in the reverse order of their disassembly. Note the following points.

- camshaft sprocket covers
  10 Nm (1.0 m•kg)
- tappet covers
  10 Nm (1.0 m•kg)
- spark plugs
  20 Nm (2.0 m•kg)

EASB0002

SYNCHRONIZING THE CARBURETORS

NOTE:

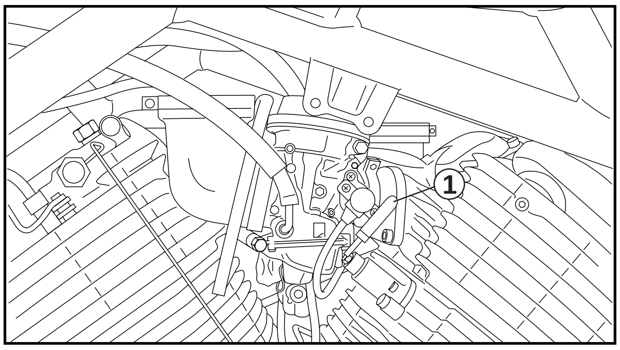
Prior to synchronizing the carburetors, the valve clearance and the engine idling speed should be properly adjusted and the ignition timing should be checked.

1. Start the engine and let it warm up for several minutes, then stop the engine.
2. Stand the motorcycle on a level surface.

NOTE:

Place the motorcycle on a suitable stand.

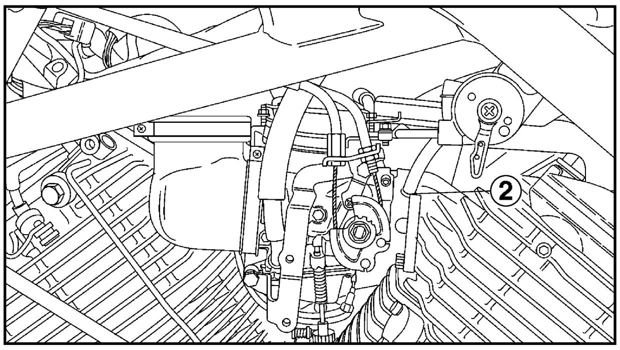
3. Remove:
   - seat
4. Lift:
   - fuel tank
     Refer to "SEAT, SIDE COVERS AND FUEL TANK".



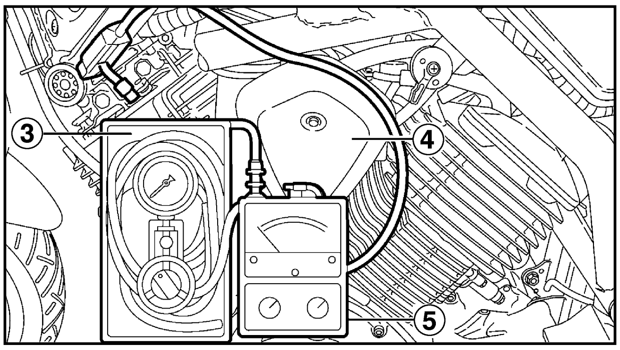
NOTE:

Do not disconnect the fuel hoses.

5. Remove:
   - carburator side covers ④
6. Remove:
   - A.I.S. hose ①
     Connect vacuum hose ③ to the A.I.S. system hose connection on front cylinder n. #2. Start the engine and fold up the fuel cock vacuum hose ② on rear cylinder n. #1. Fix the fuel cock vacuum hose by means of a plastic clamp to keep the fuel cock open.



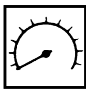
7. Remove:
   - fuel cock vacuum hose ②
     Connect the other vacuum hose ③ to the fuel cock vacuum hose on rear cylinder n. #1.



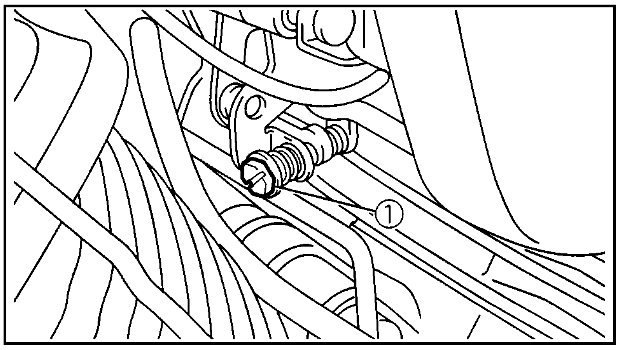
8. Install:
   - engine tachometer ⑤
     (to the spark plug lead of rear cylinder #1)

Vacuum gauge:
90890-03094
Engine tachometer:
90890-03113

9. Check:
   - engine idling speed
     Out of specification → Adjust.
     Refer to "ADJUSTING THE ENGINE IDLING SPEED".



Engine idling speed:
950 ~ 1,050 r/min



10. Adjust:
    - carburetor synchronization

▼▼

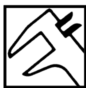
a. Synchronize carburetor #1 to carburetor #2 by turning the synchronizing screw ① in either direction until both gauges read the same.
b. Rev the engine two or three times, each time for less than a second, and check the synchronization again.

Vacuum pressure at idle speed:
32.2 ~ 33.6 kPa (242 ~ 252 mmHg)

NOTE:
The difference between the two carburetors should not exceed 1.33 kPa (10 mmHg).

▲▲

11. Check:
    - engine idling speed
      Out of specification → Adjust.
12. Stop the engine and remove the measuring equipment.
13. Adjust:
    - throttle cable free play
      Refer to "ADJUSTING THE THROTTLE CABLE FREE PLAY".



Throttle cable free play (at the flange of the throttle grip)
3 ~ 5 mm

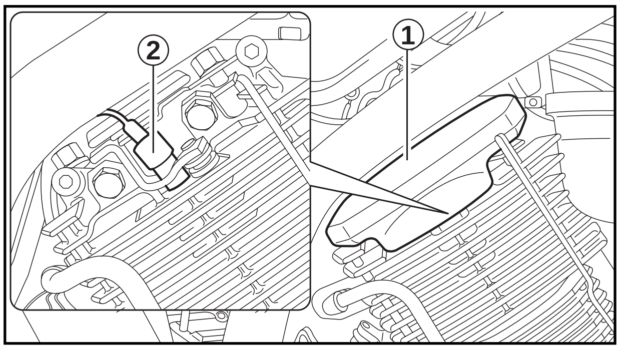
14. Install:
    - fuel cock vacuum hose
    - A.I.S. hose
    - carburator covers
    - fuel tank
    - seat

EAS00054

ADJUSTING THE ENGINE IDLING SPEED

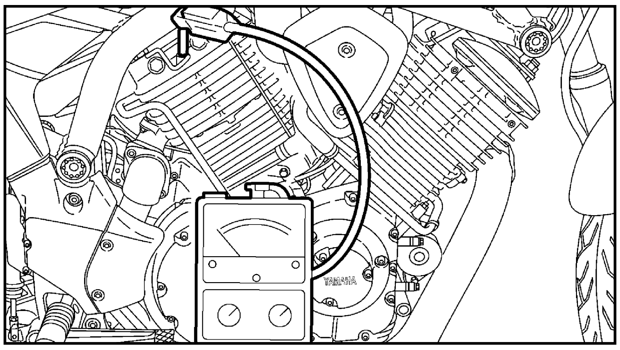
NOTE:

Prior to adjusting the engine idling speed, the carburetor synchronization should be adjusted properly, the air filter should be clean, and the engine should have adequate compression.



1. Start the engine and let it warm up for several minutes.
2. Remove:
   - cylinder head cover ①
3. Install:
   - engine tachometer (to the spark plug lead ② of cyl. #1)

	Engine tachometer: **90890-03113**

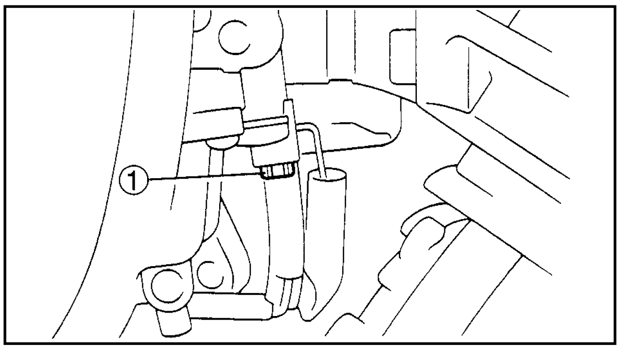


4. Check:
   - engine idling speed
     Out of specification → Adjust.

	Engine idling speed: **950 ~ 1,050 r/min**

5. Adjust:
   - engine idling speed

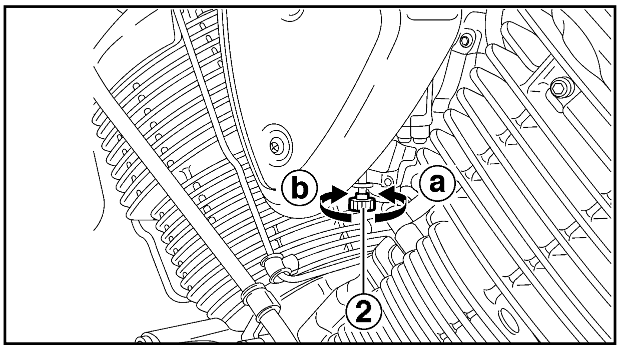
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a. Turn the pilot screw ① in until it is lightly seated.

b. Turn the pilot screw out the specified number of turns.

	Pilot screw: **3 turns out**

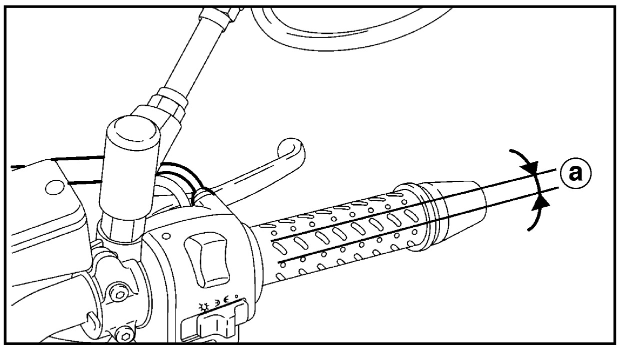


c. Turn the throttle stop screw ② in direction ⓐ or ⓑ until the specified engine idling speed is obtained.

Direction ⓐ	**Engine idling speed is increased.**
Direction ⓑ	**Engine idling speed is decreased.**

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6. Adjust:
   - throttle cable free play
     Refer to "ADJUSTING THE THROTTLE CABLE FREE PLAY".



EASB0003

ADJUSTING THE THROTTLE CABLE FREE PLAY

NOTE:

Prior to adjusting the throttle cable free play, the engine idling speed should be adjusted.

1. Check:
   - throttle cable free play ⓐ
     Out of specification → Adjust.

	Throttle cable free play (at the flange of the throttle grip) **3 ~ 5 mm**

2. Remove:
   - carburetor cover (left)
3. Adjust:
   - throttle cable free play

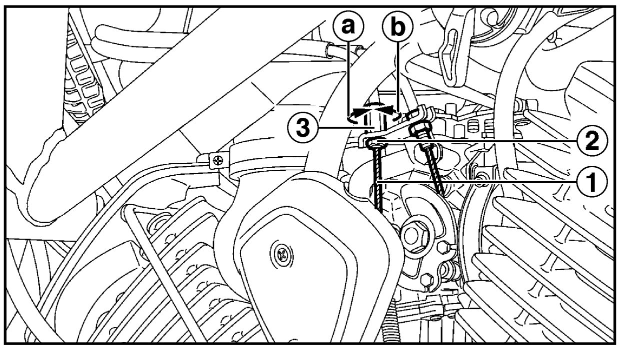
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NOTE:

When the motorcycle is accelerating, the accelerator cable ① is pulled.

Carburetor side

a. Loosen the locknut ② on the accelerator cable.
b. Turn the adjusting nut ③ in direction ⓐ or ⓑ until the specified throttle cable free play is obtained.

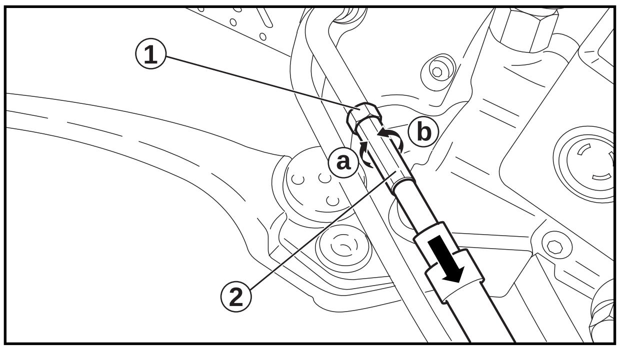


Direction ⓐ	**Throttle cable free play is decreased.**
Direction ⓑ	**Throttle cable free play is increased.**

c. Tighten the locknuts.

NOTE:

If the specified throttle cable free play cannot be obtained on the carburetor side of the cable, use the adjusting nut on the handlebar side.



Handlebar side

a. Loosen the locknut ①.
b. Turn the adjusting nut ② in direction ⓐ or ⓑ until the specified throttle cable free play is obtained.

Direction ⓐ	Throttle cable free play is increased.
Direction ⓑ	Throttle cable free play is decreased.

c. Tighten the locknut.

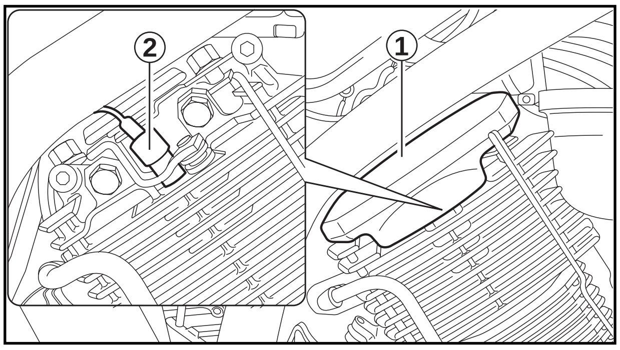
⚠ WARNING

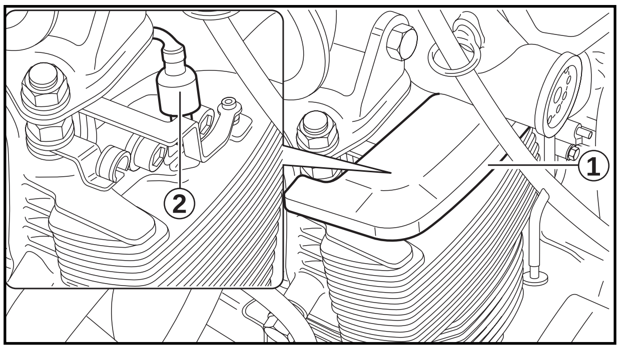
After adjusting the throttle cable free play, turn the handlebar to the right and to the left to ensure that this does not cause the engine idling speed to change.

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EASB0004

CHECKING THE SPARK PLUGS





The following procedure applies to all of the spark plugs.

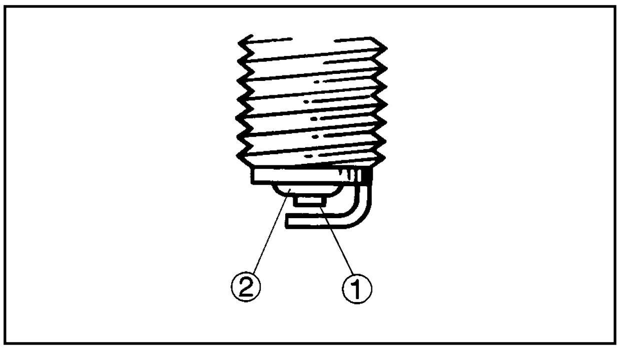
1. Remove:
   - cylinder head covers ①
2. Disconnect:
   - spark plug caps ②
3. Remove:
   - spark plugs

CAUTION:

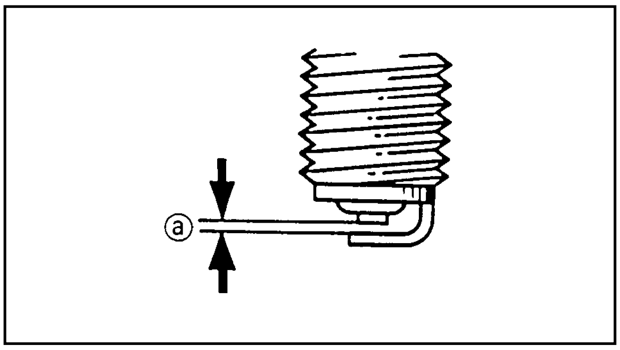
Before removing the spark plugs, blow away any dirt accumulated in the spark plug wells with compressed air to prevent it from falling into the cylinders.

4. Check:
   - spark plug type
     Incorrect → Change.

Spark plug type (manufacturer)
BPR7ES (NGK) - W22EPR-U (DENSO)



5. Check:
   - electrode ①
     Damage/wear → Replace the spark plug.
   - insulator ②
     Abnormal color → Replace the spark plug.
     Normal color is a medium-to-light tan color.
6. Clean:
   - spark plug
     (with a spark plug cleaner or wire brush)
7. Measure:
   - spark plug gap ⓐ (with a wire gauge)
     Out of specification → Regap.

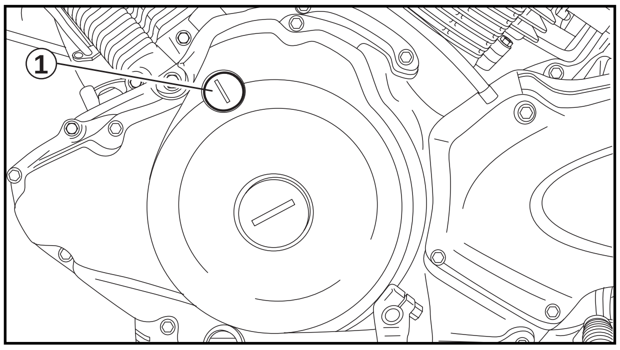


Spark plug gap
0.7 ~ 0.8 mm

8. Install:
   • spark plugs — 20 Nm (2.0 m•kg)

NOTE:
Before installing the spark plug, clean the spark plug and gasket surface.

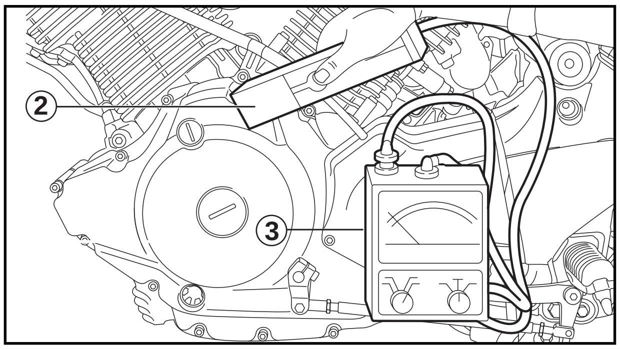
9. Connect:
   • spark plug caps
10. Install:
   • cylinder head covers



EAS00064

CHECKING THE IGNITION TIMING

NOTE:
Prior to checking the ignition timing, check the wiring connections of the entire ignition system. Make sure that all connections are tight and free of corrosion.



1. Remove:
   • timing plug ①
2. Install:
   • timing light ②
   • engine tachometer ③ (to the spark plug lead of cylinder #1)

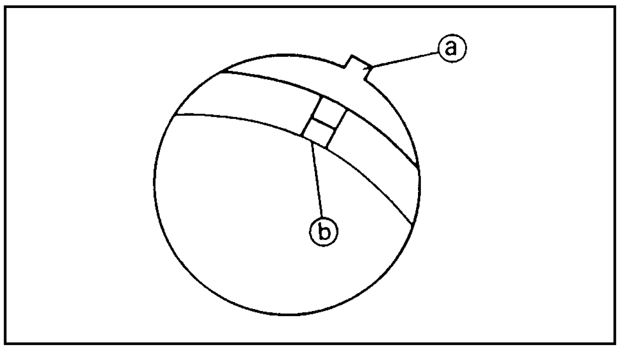
Timing light: **90890-03141** **Engine tachometer:** **90890-03113**

3. Check:
   • ignition timing

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a. Start the engine, warm it up for several minutes, and then let it run at the specified engine idling speed.

Engine idling speed: **950 ~ 1,050 r/min**



b. Check that the stationary pointer ⓐ is within the firing range ⓑ on the generator rotor.
   Incorrect firing range → Check the ignition system.

NOTE:
The ignition timing is not adjustable.

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4. Install:
   • timing plug

EAS00065

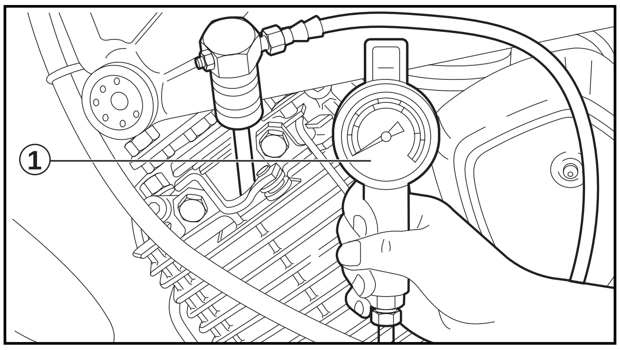
MEASURING THE COMPRESSION PRESSURE

The following procedure applies to all of the cylinders.

NOTE:

Insufficient compression pressure will result in a loss of performance.

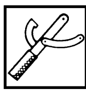
1. Check:
   - valve clearance
     Out of specification → Adjust.
     Refer to "ADJUSTING THE VALVE CLEARANCE".
2. Start the engine, warm it up for several minutes, and then turn it off.
3. Disconnect:
   - spark plug cap
4. Remove:
   - spark plug



CAUTION:

Before removing the spark plugs, use compressed air to blow away any dirt accumulated in the spark plug wells to prevent it from falling into the cylinders.

5. Install:
   - compression gauge ①

	**Compression gauge set:** **90890-03081**

6. Measure:
   - compression pressure
     Above the maximum pressure → Inspect the cylinder head, valve surfaces, and piston crown for carbon deposits.
     Below the minimum pressure → Squirt a few drops of oil into the affected cylinder and measure again.
   - Refer to the following table.

Compression pressure (with oil applied in the cylinder)	
Reading	**Diagnosis**
Higher than without oil	**Piston wear or damage → Repair**
Same as without oil	**Piston ring(s), valves, cylinder head gasket or piston possibly defective → Repair**

Compression pressure (at sea level)
Standard:
1,000 kPa (10 kg/cm², 10 bar)
Minimum:
900 kPa (9 kg/cm², 9 bar)
Maximum:
1,100 kPa (11 kg/cm², 11 bar)

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a. Turn the main switch to "ON".
b. With the throttle wide open, crank the engine until the reading on the compression gauge stabilized.

⚠ WARNING

To prevent sparking, ground all spark plug leads before cranking the engine.

NOTE:

The difference in compression pressure between cylinders should not exceed 100 kPa (1 kg/cm², 1 bar).

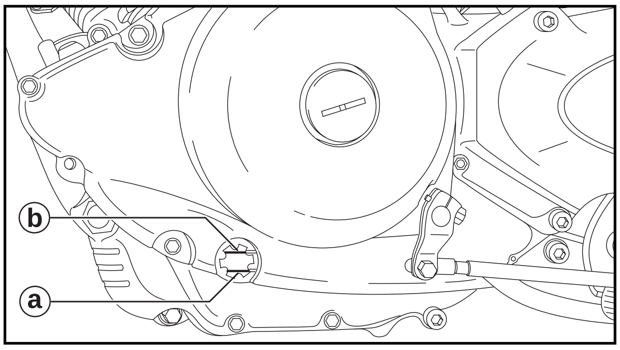
7. Install:
   - spark plug — **20 Nm (2.0 m•kg)**
8. Connect:
   - spark plug cap

EAS00069

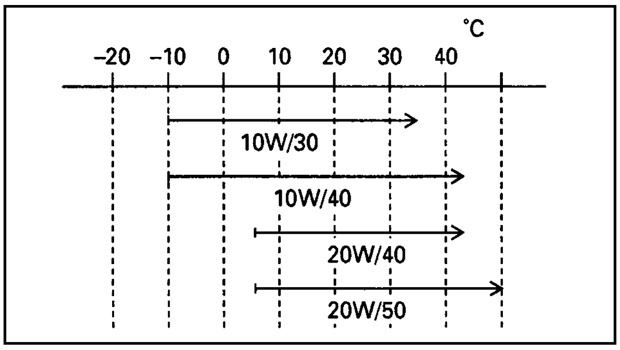
CHECKING THE ENGINE OIL LEVEL

1. Stand the motorcycle on a level surface.

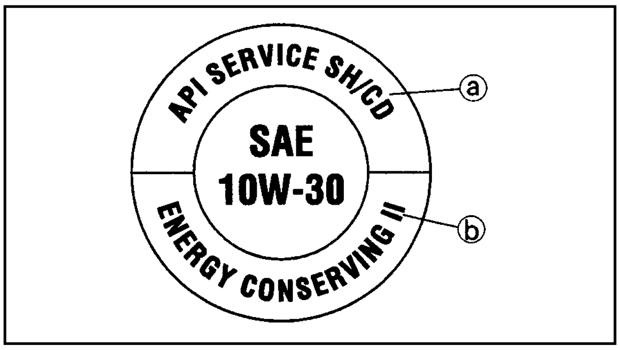
NOTE:
- Place the motorcycle on a suitable stand.
- Make sure that the motorcycle is upright.



2. Let the engine idle for a few minutes.
3. Check:
   - engine oil level
   - The engine oil level should be between the minimum level marks ⓐ and maximum level marks ⓑ.
   Below the minimum level mark → Add the recommended engine oil to the proper level.



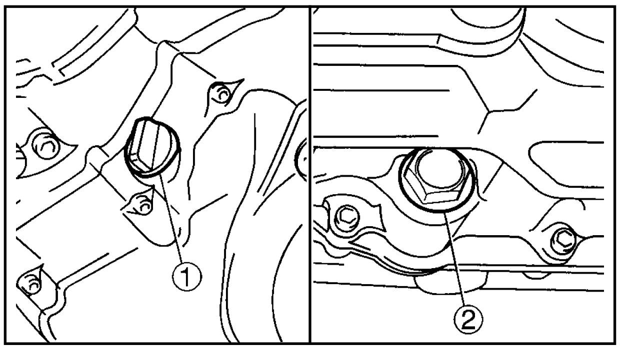
Recommended engine oil
Refer to the chart for the engine oil grade which is best suited for certain atmospheric temperatures.
API standard
SE or higher grade
ACEA standard
G4 or G5



CAUTION:
- **Engine oil also lubricates the clutch and the wrong oil types or additives could cause clutch slippage. Therefore, do not add any chemical additives or use engine oils with a grade of CD ⓐ or higher and do not use oils labeled "ENERGY CONSERVING II" ⓑ or higher.**
- **Do not allow foreign materials to enter the crankcase.**

4. Start the engine, warm it up for several minutes, and then turn it off.
5. Check the engine oil level again.

NOTE:
Before checking the engine oil level, wait a few minutes until the oil has settled.



EASB0005

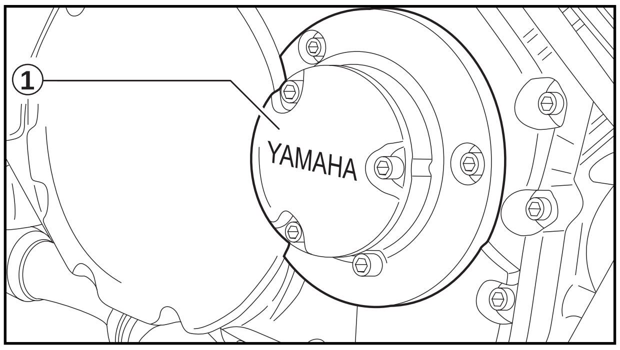
CHANGING THE ENGINE OIL

1. Start the engine, warm it up for several minutes, and then turn it off.
2. Place a container under the engine oil drain bolt.
3. Remove:
   - engine oil filler cap ①
   - O-ring
   - engine oil drain bolt ②
   - gasket
4. Drain:
   - engine oil
     (completely from the crankcase)
5. If the oil filter element is also to be replaced, perform the following procedure.

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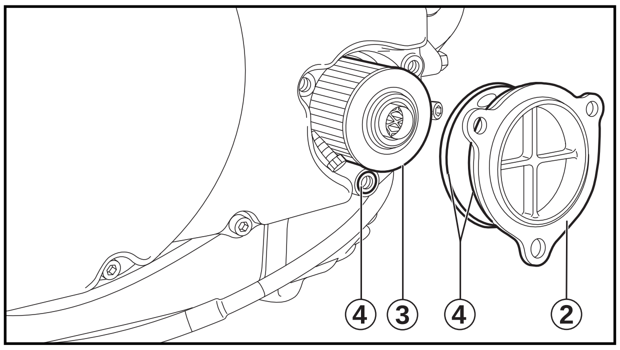
⚠ WARNING

Oil filter element replacement should be made at room temperature.



a. Remove the oil filter element cover plate ①, element cover ② and oil filter element ③.
b. Check the O-ring ④ and replace it if it is cracked or damaged.
c. Install the new oil filter element and the element cover.

Oil filter element cover bolt
10 Nm (1.0 m•kg)



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6. Check:
   - engine oil drain bolt gasket
     Damage → Replace.
7. Install:
   - gasket
   - engine oil drain bolt

43 Nm (4.3 m•kg)

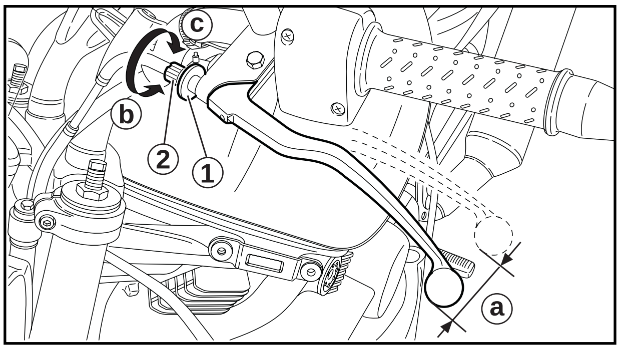
8. Fill:
   - crankcase
     (with the specified amount of the recommended engine oil)

Quantity **Total amount: 3.6 L** **Without oil filter element replacement:** **3.0 L** **With oil filter element replacement: 3.1 L**

9. Install:
   - O-ring
   - engine oil filter cap
10. Start the engine, warm it up for several minutes, and then turn it off.
11. Check:
    - engine (for engine oil leaks)
12. Check:
    - engine oil level
      Refer to "CHECKING THE ENGINE OIL LEVEL".

EASB0006

ADJUSTING THE CLUTCH CABLE FREE PLAY



1. Check:
   - clutch cable free play ⓐ
     Out of specification → Adjust.

Clutch cable free play **(at the end of the clutch lever)** **5 ~ 10 mm**

2. Adjust:
   - clutch cable free play

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Handlebar side

a. Loosen the locknut ①.
b. Turn the adjusting screw ② in direction ⓑ or ⓒ until the specified clutch cable free play is obtained.

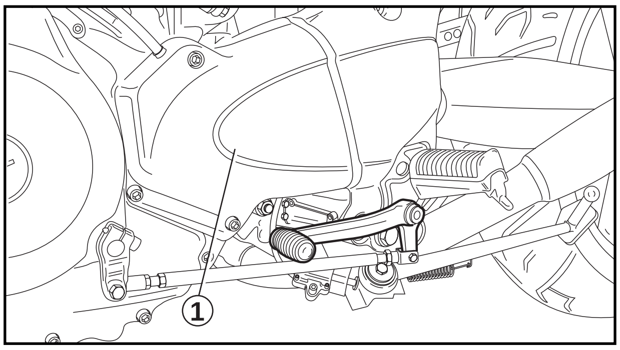
Direction ⓑ	**Clutch cable free play is increased.**
Direction ⓒ	**Clutch cable free play is decreased.**

c. Tighten the locknut.

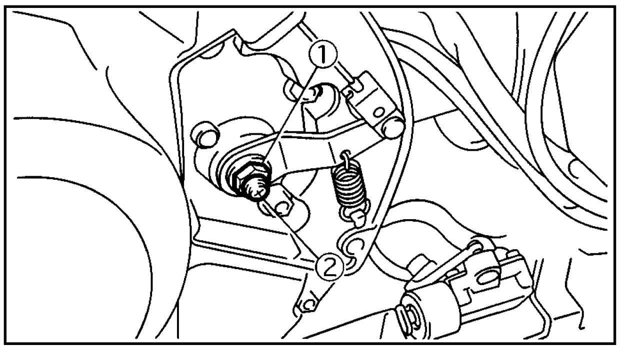
NOTE:

If the specified clutch cable free play cannot be obtained as described above, perform the mechanism adjustment procedure described below.

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3. Remove:
   - clutch adjusting cover ①



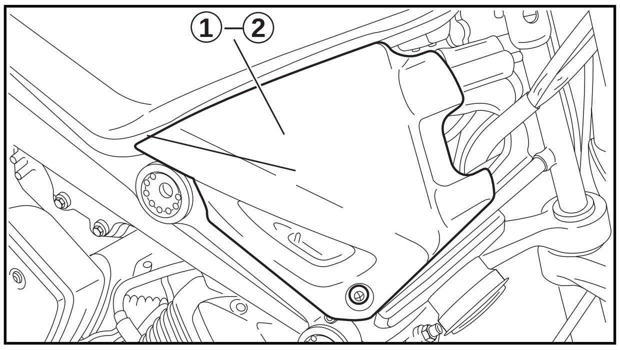
4. Adjust:
   - clutch mechanism

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Engine side

a. Loosen the locknut ①.
b. Turn in the adjusting screw ② until it is lightly seated.
c. Turn the adjusting screw out 1/4 of a turn.
d. Tighten the locknut.
e. Check the clutch cable free play again and adjust it if necessary.

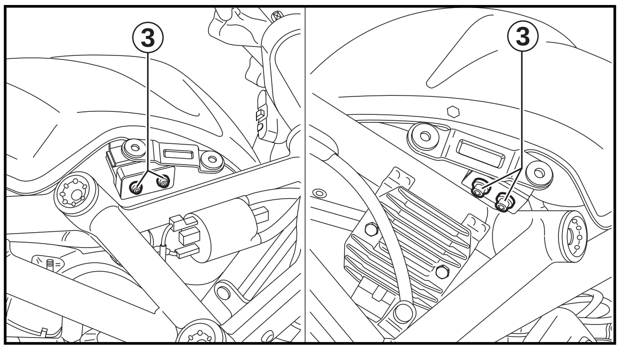
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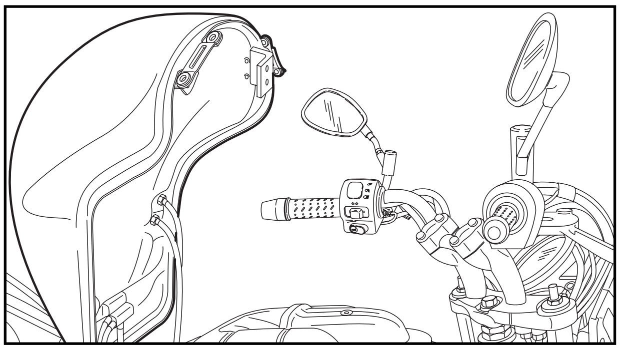
EASB0007

CLEANING THE AIR FILTER ELEMENT

1. Remove:
   - seat
   - fuel tank panels ① and ②
     Refer to "SEAT, SIDE COVERS AND FUEL TANK".



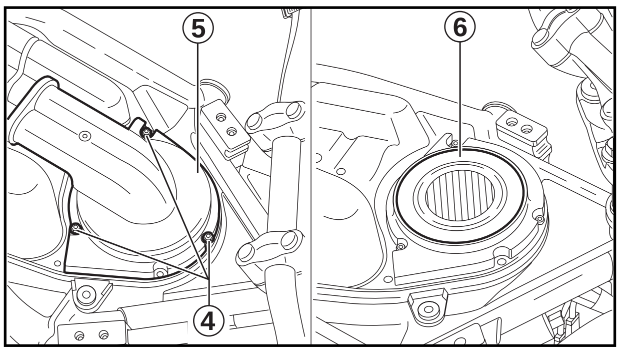
2. Remove:
   - fuel tank bolts ③



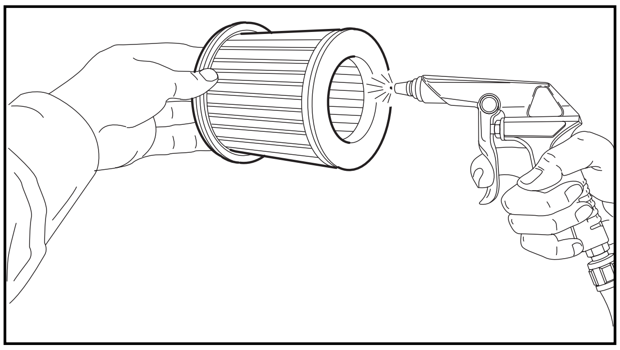
3. Lift:
   - fuel tank (do not disconnect the fuel hoses)

⚠ WARNING

- **Make sure that the fuel tank is securely supported.**
- **Do not tilt or pull the fuel tank too much, otherwise the fuel hoses may come loose, which could cause fuel leakage.**



4. Remove:
   - air filter case cover screws ④
   - air filter case cover ⑤
   - air filter element ⑥



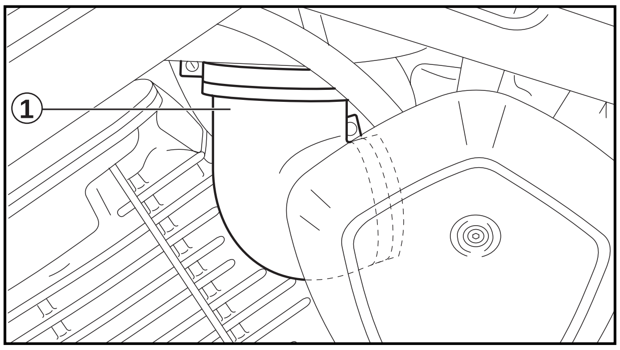
5. Clean:
   - air filter element
     Apply compressed air to the outer surface of the air filter element.
6. Check:
   - air filter element
     Damage → Replace.
7. Install:
   - air filter element
   - air filter case cover
   - fuel tank
   - fuel tank panels

CAUTION:

Never operate the engine without the air filter element installed. Unfiltered air will cause rapid wear of engine parts and may damage the engine. Operating the engine without the air filter element will also affect the carburetor turning, leading to poor engine performance and possible overheating.

NOTE:

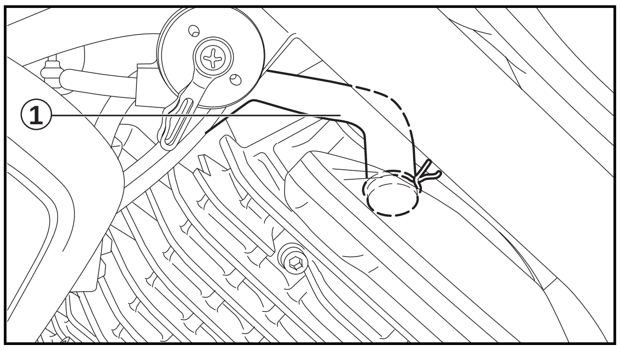
When installing the air filter element into the air filter case cover, be sure their sealing surfaces are aligned to prevent any air leaks.



EAS00094

CHECKING THE CARBURETOR JOINT AND INTAKE MANIFOLD

1. Check:
   - carburetor joint ①
     Cracks/damage → Replace.
     Refer to "CARBURETOR" in chapter 5.



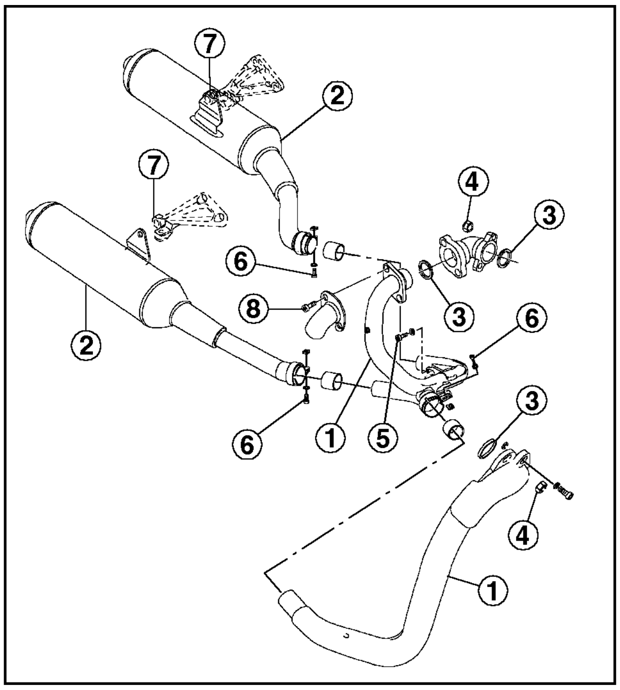
EAS00098

CHECKING THE BREATHER HOSE

1. Remove:
   - cylinder head cover
2. Check:
   - cylinder head breather hose ①
     Cracks/damage → Replace.
     Loose connection → Connect properly.

CAUTION:

Make sure that the cylinder head breather hose is routed correctly.



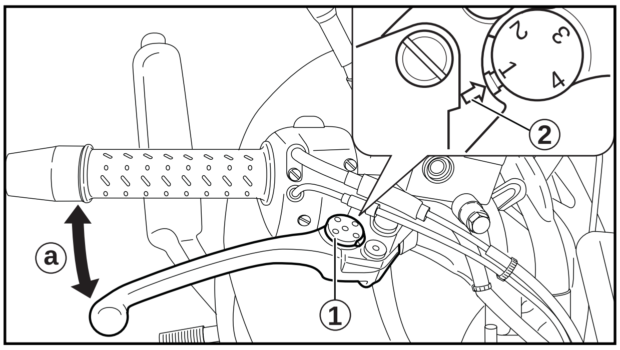
EAS00100

CHECKING THE EXHAUST SYSTEM

The following procedure applies to all of the exhaust pipes, mufflers and gaskets.

1. Check:
   - exhaust pipes ①
   - muffler ②
     Cracks/damage → Replace.
   - gaskets ③
     Exhaust gas leaks → Replace.
2. Check:
   - tightening torque

Exhaust pipe nut ④
20 Nm (2.0 m•kg)
Exhaust pipe bracket bolt ⑤
25 Nm (2.5 m•kg)
Exhaust pipe strap ⑥
18 Nm (1.8 m•kg)
Muffler and passenger footrest bolt ⑦
47 Nm (4.7 m•kg)
Exhaust pipe bolt/Rear guard fastener ⑧
20 Nm (2.0 m•kg)



EB304001

CHASSIS

ADJUSTING THE FRONT BRAKE

1. Adjust:
   - brake lever position
     (distance ⓐ between the brake lever and the handlebar grip)

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a. Turn the adjusting dial ① while holding the lever pushed away from the handlebar grip

NOTE:

Align the setting on the adjusting dial with the arrow mark ②

Position n. 1	**Maximum ⓐ distance**
Position n. 4	**Minimum ⓐ distance**

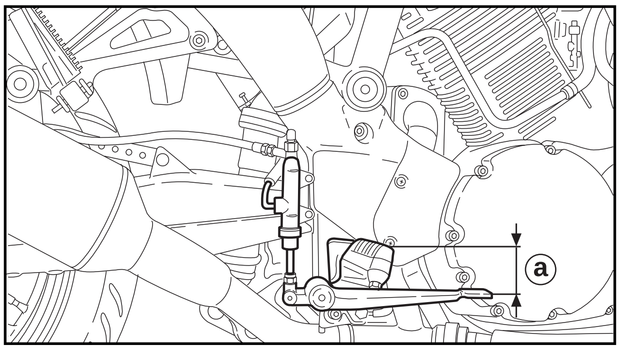
⚠ WARNING

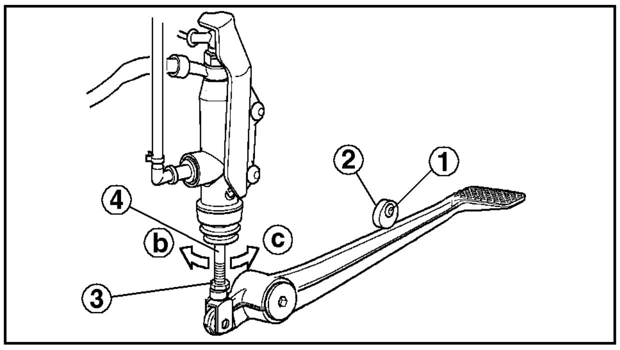
After adjusting the brake lever position, make sure the pin on the brake lever holder is firmly inserted in the hole in the adjusting dial.

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⚠ WARNING

A soft or spongy feeling in the brake lever can indicate the presence of air in the brake system. Before the vehicle is operated, the air must be removed by bleeding the brake system. Air in the brake system will considerably reduce braking performance and could result in loss of control and possibly an accident. Therefore, inspect and, if necessary, bleed the brake system. After adjusting the brake lever free play, make sure that there is no brake drag.





EASB0008

ADJUSTING THE REAR BRAKE

1. Check:
   - brake pedal position
     (distance ⓐ from the top of the rider footrest to the top of the brake pedal)

	Brake pedal position (below the top of the rider footrest) **43 mm**

Out of specification → Adjust.

2. Adjust:

▼▼

- brake pedal position

a. Loosen the bolt ① of the adjusting dial ②.
b. Turn the adjusting dial ② until the specified brake pedal position is obtained, then tighten the bolt ①.
c. Loosen the locknut ③.
d. Turn the adjusting bolt ④ in direction ⓑ or ⓒ until the correct free play between brake pedal

Direction ⓑ →	**Brake pedal free play is increased.**
Direction ⓒ →	**Brake pedal free play is decreased.**

	Brake pedal and master cylinder free play: **2 - 3 mm (at the front end of the brake pedal)**

and master cylinder is obtained.

	Locknut **12 Nm (1.2 m•kg)**

e. Tighten the locknut ① to specification.

EAS00115

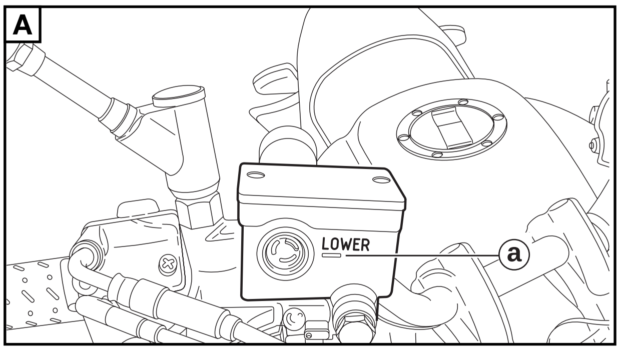
CHECKING THE BRAKE FLUID LEVEL

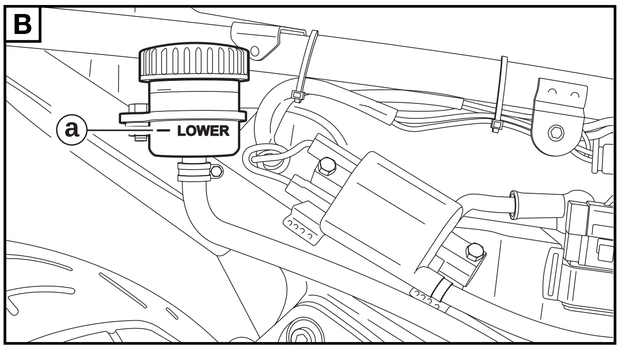
1. Stand the motorcycle on a level surface.

NOTE:

- Place the motorcycle on a suitable stand.
- Make sure that the motorcycle is upright.

2. Check:
   - brake fluid level
     Below the minimum level mark ⓐ → Add the recommended brake fluid to the proper level.





Recommended brake fluid:
DOT4

[A] Front brake
[B] Rear brake

⚠ WARNING

- **Use only the designated brake fluid. Other brake fluids may cause the rubber seals to deteriorate, causing leakage and poor brake performance.**
- **Refill with the same type of brake fluid that is already in the system. Mixing brake fluids may result in a harmful chemical reaction, leading to poor brake performance.**
- **When refilling, be careful that water does not enter the reservoir. Water will significantly lower the boiling point of the brake fluid and could cause vapor lock.**

CAUTION:

Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any spilt brake fluid immediately.

NOTE:

In order to ensure a correct reading of the brake fluid level, make sure that the top of the reservoir is horizontal.

EAS00131

CHECKING THE BRAKE HOSES

The following procedure applies to all of the brake hoses and clamps.

1. Check:
   - brake hose
     Cracks/damage/wear → Replace.
2. Check:
   - brake hose clamp
     Loose connection → Tighten.
3. Hold the motorcycle upright and apply the brake.
4. Check:
   - brake hose
     Activate the brake several times.
     Brake fluid leakage → Replace the damage hose.
     Refer to "FRONT AND REAR BRAKES" in chapter 6.

EAS00134

BLEEDING THE HYDRAULIC BRAKE SYSTEM

WARNING

Bleed the hydraulic brake system whenever:
- **the system was disassembled,**
- **a brake hose was loosened or removed,**
- **the brake fluid level is very low,**
- **brake operation is faulty.**

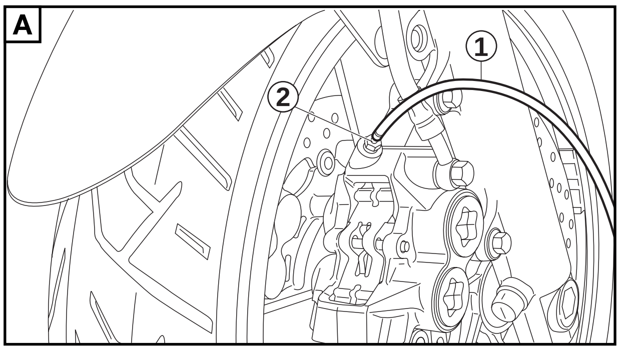
NOTE:
- Be careful not to spill any brake fluid or allow the brake master cylinder reservoir or brake fluid reservoir to overflow.
- When bleeding the hydraulic brake system, make sure that there is always enough brake fluid before applying the brake. Ignoring this precaution could allow air to enter the hydraulic brake system, considerably lengthening the bleeding procedure.
- If bleeding is difficult, it may be necessary to let the brake fluid settle for a few hours. Repeat the bleeding procedure when the tiny bubbles in the hose have disappeared.

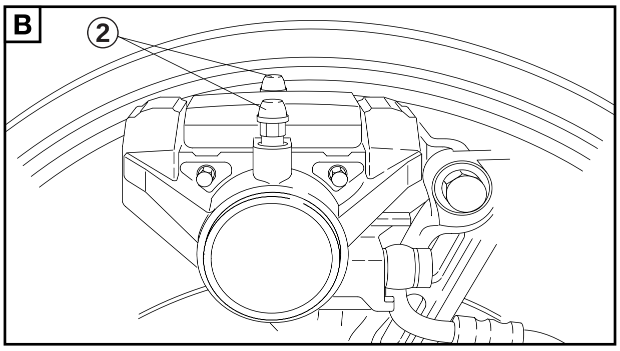
1. Stand the motorcycle on a level surface.

NOTE:
- Place the motorcycle on a suitable stand.
- Make sure that the motorcycle is upright.

2. Bleed:
   - hydraulic brake system

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a. Add the recommended brake fluid to the proper level.
b. Install the diaphragm (brake master cylinder reservoir or brake fluid reservoir).
c. Connect a clear plastic hose ① tightly to the bleed screw ②.
   [A]: Front [B]: Rear
d. Place the other end of the hose into a container.
e. Slowly apply the brake several times.
f. Fully squeeze the brake lever or fully depress the brake pedal and hold it in position.
g. Loosen the bleed screw.
   This will release the tension and cause the brake lever to contact the throttle grip or the brake pedal to fully extend.
h. Tighten the bleed screw and then release the brake lever or brake pedal.
i. Repeat steps (e) to (h) until all of the air bubbles have disappeared from the brake fluid in the plastic hose.
j. Tighten the bleed screw to specification.

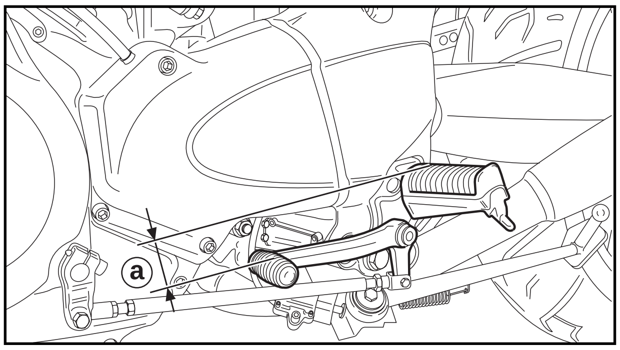
Bleed screw
6 Nm (0.6 m•kg)

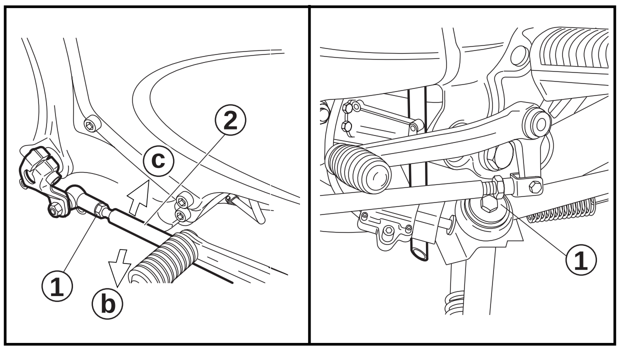
k. Fill the reservoir to the proper level.
   Refer to "CHECKING THE BRAKE FLUID LEVEL".

⚠ WARNING

After bleeding the hydraulic brake system, check the brake operation.

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EASB0009

ADJUSTING THE SHIFT PEDAL

1. Check:
   - shift pedal position (distance ⓐ from the top of the rider footrest to the top of the shift pedal)
     Out of specification → Adjust.

Shift pedal position (below the top of the rider footrest)
45 mm

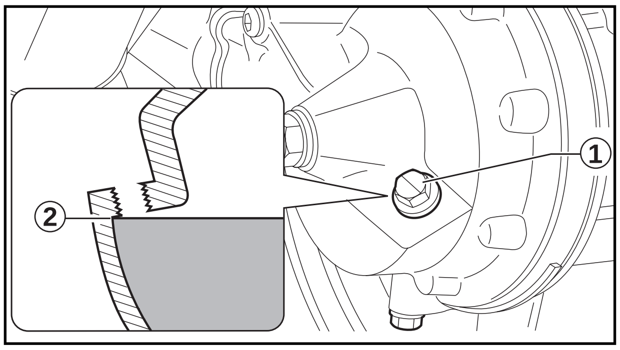
2. Adjust:
   - shift pedal position

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a. Loosen both locknuts ①.
b. Turn the shift rod ② in direction ⓑ or ⓒ to obtain the correct shift pedal position.

Direction ⓑ →	**Shift pedal is raised.**
Direction ⓒ →	**Shift pedal is lowered.**

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EAS00144

CHECKING THE FINAL DRIVE OIL LEVEL

1. Stand the motorcycle on a level surface.

NOTE:
- Place the motorcycle on a suitable stand.
- Make sure that the motorcycle is upright.

2. Remove:
   - final drive housing oil filler bolt ①
3. Check:
   - final drive oil level
     The final drive oil level should be to the bottom brim ② of the filler hole.
     Below the bottom brim → Add the recommended final drive oil to the proper level.

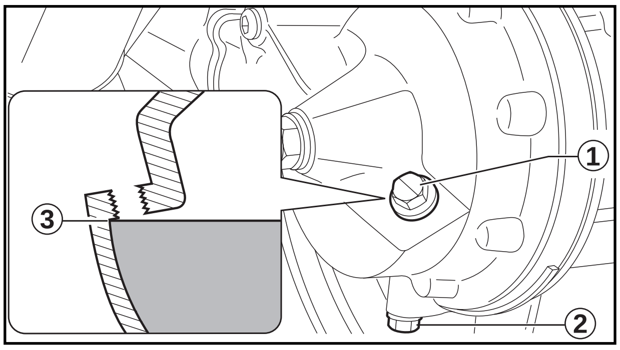
Recommended final drive oil **SAE 80 hypoid gear oil** **graded "GL-4", "GL-5" or "GL-6"** **or** **multi-purpose SAE 80W90** **hypoid gear oil**

4. Install:
   - final drive housing oil filler bolt

23 Nm (2.3 m•kg)

EAS00145

CHANGING THE FINAL DRIVE OIL



1. Place a container under the final drive housing.
2. Remove:
   - final drive housing oil filler bolt ①
   - final drive housing oil drain bolt ②
     Completely drain the final drive housing of its oil.
3. Check:
   - final drive housing oil drain bolt gasket
     Damage → Replace.
4. Install:
   - final drive housing oil drain bolt

23 Nm (2.3 m•kg)

5. Fill:
   - final drive housing (to the bottom brim ③ of the filler hole) (with the specified amount of the recommended final drive oil)

Quantity **0.2 L**

6. Install:
   - final drive housing oil filler bolt

23 Nm (2.3 m•kg)

Refer to "CHECKING THE FINAL DRIVE OIL LEVEL".

EASB0010

CHECKING AND ADJUSTING THE STEERING HEAD

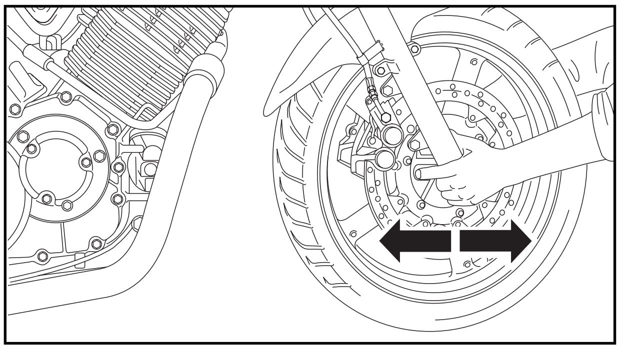
1. Stand the motorcycle on a level surface.

⚠ WARNING

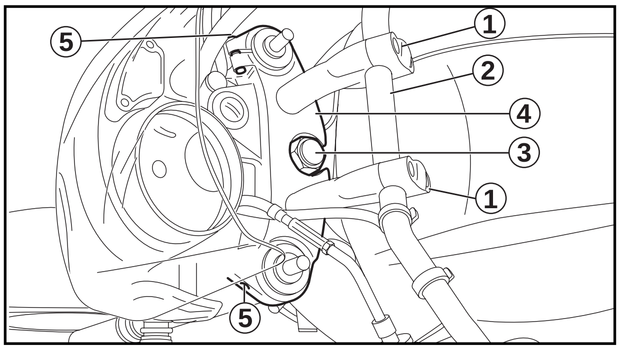
Securely support the motorcycle so that there is no danger of it falling over.

NOTE:

Place the motorcycle on a suitable stand so that the front wheel is elevated.



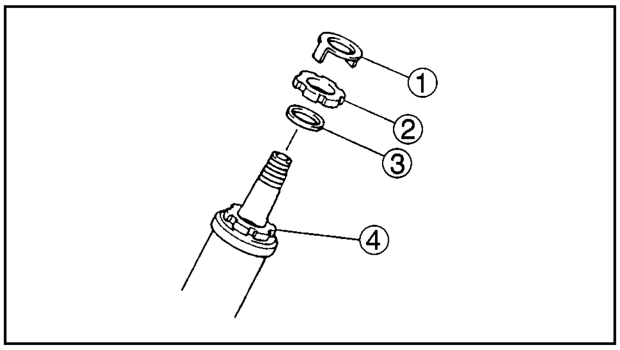
2. Check:
   - steering head
     Grasp the bottom of the front fork legs and gently rock the front fork.
     Looseness or binding → Adjust the steering head.
3. Remove:
   - seat
4. Lift:
   - fuel tank
     Refer to "SEAT, SIDE COVERS AND FUEL TANK".
5. Tilt forward:
   - cowling
6. Remove:
   - meter assy
7. Disconnect:
   - main switch coupler
8. Remove:
   - upper handle holder ①
   - handle ②

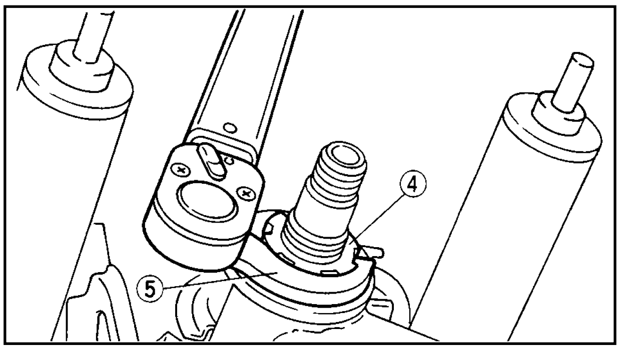


9. Remove
   - steering crown nut ③
   - upper bracket ④
     (loosen bolts ⑤)
10. Adjust:
    - steering head

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a. Remove the lock washer ①, the upper ring nut ② and the rubber washer ③.
b. Loosen the lower ring nut ④ and then tighten it to specification with a ring nut wrench ⑤.





NOTE:
Set the torque wrench at a right angle to the ring nut wrench ⑤.

Ring nut wrench
90890-01403

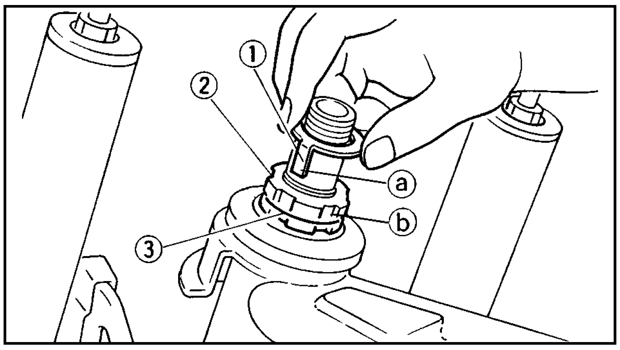
Lower ring nut
(initial tightening torque)
52 Nm (5.2 m•kg)

c. Loosen the lower ring nut ④ completely, then tighten it to specification.

⚠ WARNING

Do not overtighten the lower ring nut.

Lower ring nut
(final tightening torque)
18 Nm (1.8 m•kg)



d. Check the steering head for looseness or binding by turning the front fork all the way in both directions. If any binding is felt, remove the lower bracket and inspect the upper and lower bearings. Refer to "STEERING HEAD AND HANDLEBAR" in chapter 6.
e. Install the rubber washer ③.
f. Install the upper ring nut ②.
g. Finger tighten the upper ring nut ②, then align the slots of both ring nuts. If necessary, hold the lower ring nut and tighten the upper ring nut until their slots are aligned.
h. Install the lock washer ①.

NOTE:
Make sure that the lock washer tabs ⓐ sit correctly in the ring nut slots ⓑ.

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11. Install:
    • steering crown nut

Steering crown nut
110 Nm (11.0 m•kg)
Upper bracket bolt
25 Nm (2.5 m•kg)

12. Install:
    - handle
13. Install:
    - upper handle holder
      Refer to “INSTALLING THE HANDLEBAR” in chapter 6.

	Handle holder bolt **23 Nm (2.3 m•kg)**

14. Connect:
    - main switch coupler
15. Install:
    - meter assy

	Meter bracket **10 Nm (1.0 m•kg)**

16. Install:
    - cowling
    - fuel tank
      Refer to "SEAT, SIDE COVERS AND FUEL TANK".

EAS00149

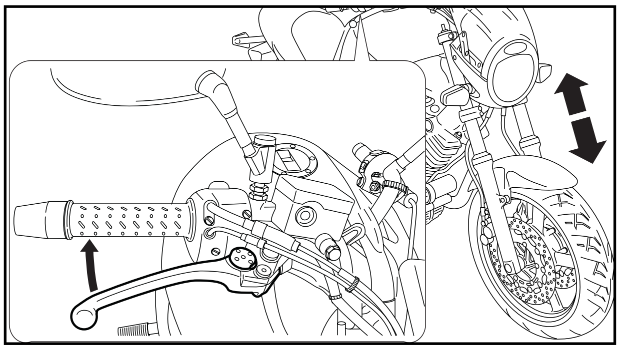
CHECKING THE FRONT FORK

1. Stand the motorcycle on a level surface.

⚠ WARNING

Securely support the motorcycle so that there is no danger of it falling over.

2. Check:
   - inner tube
     Damage/scratches → Replace.
   - oil seal
     Oil leakage → Replace.
3. Hold the motorcycle upright and apply the front brake.
4. Check:
   - operation
     Push down hard on the handlebar several times and check if the front fork rebounds smoothly.
     Unsmooth operation → Repair.
     Refer to "FRONT FORK" in chapter 6.



EAS00155

ADJUSTING THE FRONT FORK

The following procedure applies to both of the fork legs.

⚠ WARNING

- **Always adjust both fork legs equally, otherwise poor handling and loss of stability may result.**
- **Securely support the motorcycle so that there is no danger of it falling over.**

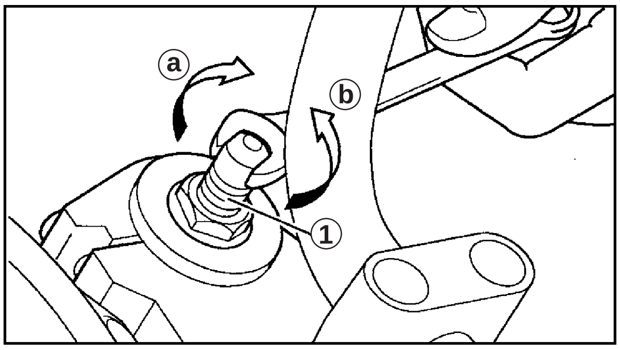
Spring preload

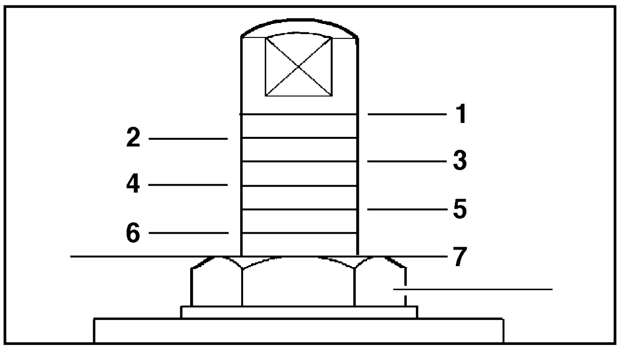
CAUTION:

- **Marks are provided on adjusting bolts.**
- **Never go beyond the maximum or minimum adjustment positions.**

1. Adjust:
   - spring preload

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a. Turn the adjusting bolt ① in direction ⓐ or ⓑ.

Direction ⓐ	**Spring preload is increased (suspension is harder).**
Direction ⓑ	**Spring preload is decreased (suspension is softer).**

Adjusting position
Standard: 5
Minimum: 7 (soft)
Maximum: 1 (hard)

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EASB0011

ADJUSTING THE REAR SHOCK ABSORBER ASSEMBLY

WARNING

Securely support the motorcycle so that there is no danger of it falling over.

Spring preload

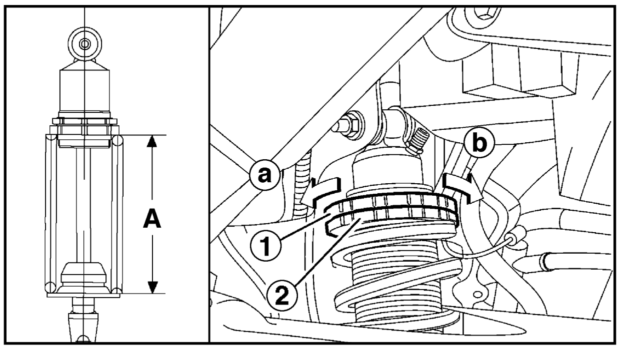
CAUTION:

Never go beyond the maximum or minimum adjustment positions.

1. Adjust:
   • spring preload

NOTE:
Use the special wrench included in the owner's tool kit to make the adjustment.

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a. Loosen the locknut ①.
b. Turn the adjusting nut ② in direction ⓐ or ⓑ.

Direction ⓐ	**Spring preload is increased (suspension is harder).**
Direction ⓑ	**Spring preload is decreased (suspension is softer).**

c. With each complete turn of the adjusting nut, spring preload changes by 1.5 mm.

Preloaded spring length A:
Standard: 162 mm
Minimum: 154 mm (hard)
Maximum: 170 mm (soft)

d. Tighten the locknut.

Locknut
45 Nm (4.5 m•kg)

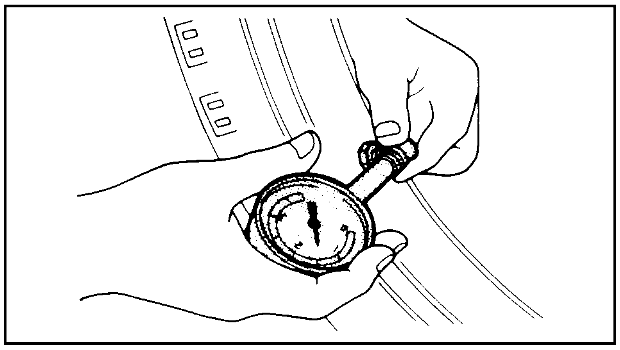
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EAS00162

CHECKING THE TIRES

The following procedure applies to both of the tires.

1. Measure:
   - tire pressure
     Out of specification → Regulate.



WARNING

- **The tire pressure should only be checked and regulated when the tire temperature equals the ambient air temperature.**
- **The tire pressure and the suspension must be adjusted according to the total weight (including cargo, rider, passenger and accessories) and the anticipated riding speed.**
- **Operation of an overloaded motorcycle could cause tire damage, an accident or an injury.**

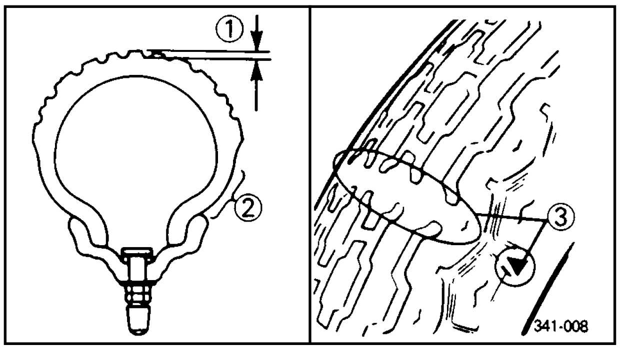
NEVER OVERLOAD THE MOTORCYCLE.

Basic weight (with oil and full fuel tank)	250.5 kg	
Maximum load	200 kg	
Cold tire pressure	Front tire	Rear tire
Up to 90 kg load*	230 kPa (2.30 kg/cm², 2.30 bar)	250 kPa (2.50 kg/cm², 2.50 bar)
90 kg ~ maximum load*	250 kPa (2.50 kg/cm², 2.50 bar)	270 kPa (2.70 kg/cm², 2.70 bar)

* Total of cargo, rider, passenger and accessories

WARNING

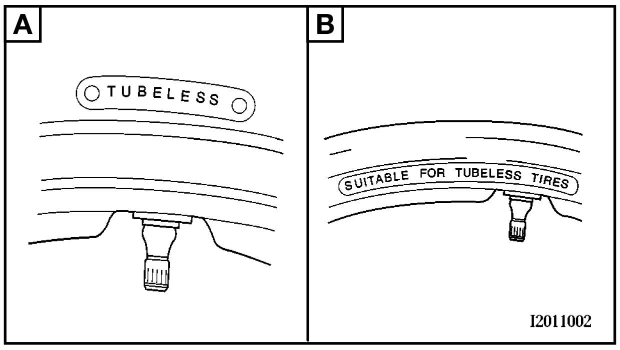
It is dangerous to ride with a worn-out tire. When the tire tread reaches the wear limit, replace the tire immediately.



2. Check:
   • tire surfaces
   Damage/wear → Replace the tire.

	Minimum tire tread depth **1.6 mm**

① Tire tread depth
② Side wall
③ Wear indicator



WARNING

- **Do not use a tubeless tire on a wheel designed only for tube tires to avoid tire failure and personal injury from sudden deflation.**
- **When using a tube tire, be sure to install the correct tube.**
- **Always replace a new tube tire and a new tube as a set.**
- **To avoid pinching the tube, make sure that the wheel rim band and tube are centered in the wheel groove.**
- **Patching a punctured tube is not recommended. If it is absolutely necessary to do so, use great care and replace the tube as soon as possible with a good quality replacement.**

[A] Tire [B] Wheel

Tube wheel	**Tube tire only**
Tubeless wheel	**Tube or tubeless tire**

After extensive tests, the tires listed below have been approved by Belgarda S.p.A. for this model. Then front and rear tires should always be by the same manufacturer and of the same design. No guarantee concerning handling characteristics can be given if a tire combination other than one approved is used on this motorcycle.

Front tire
(Tubeless)

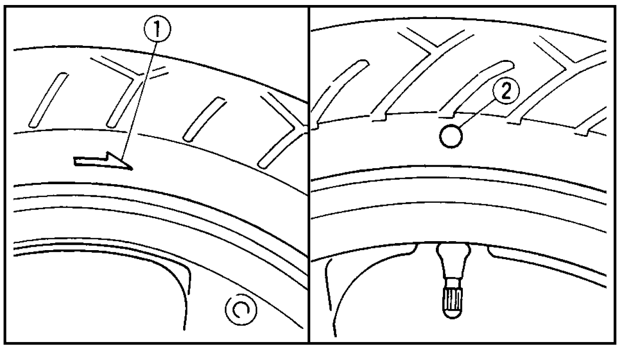
Manufacturer	Size	Type
DUNLOP	120/70-ZR17 (58W)	D205F TL
METZELER	120/70-ZR17 (58W)	MEZ3F TL

Rear tire
(Tubeless)

Manufacturer	Size	Type
DUNLOP	170/60-ZR17 (72W)	D205 TL
METZELER	170/60-ZR17 (72W)	MEZ3 TL

WARNING

New tires have a relatively low grip on the road surface until they have been slightly worn.
Therefore, approximately 100 km should be traveled at normal speed before any high-speed riding is done.



NOTE:
For tires with a direction of rotation mark ①:
- Install the tire with the mark pointing in the direction of wheel rotation.
- Align the mark ② with the valve installation point.

EAS00168

CHECKING THE WHEELS

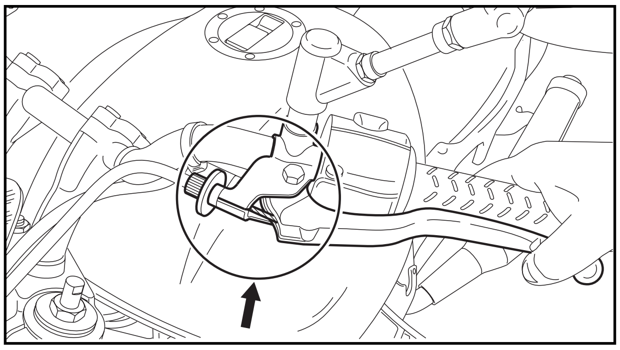
The following procedure applies to both of the wheels.

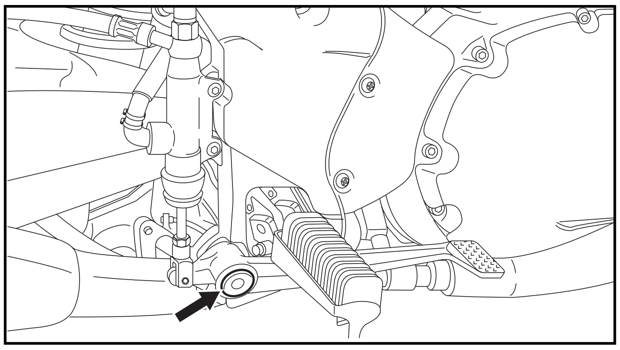
1. Check:
   - wheel
     Damage/warpage → Replace.

WARNING

Do not attempt even the smallest repair to the wheel.

NOTE:
The wheel should be balanced whenever either the tire or wheel has been changed or replaced.





EAS00170

CHECKING AND LUBRICATING THE CABLES

The following procedure applies to all of the cable sheaths and cables.

⚠ WARNING

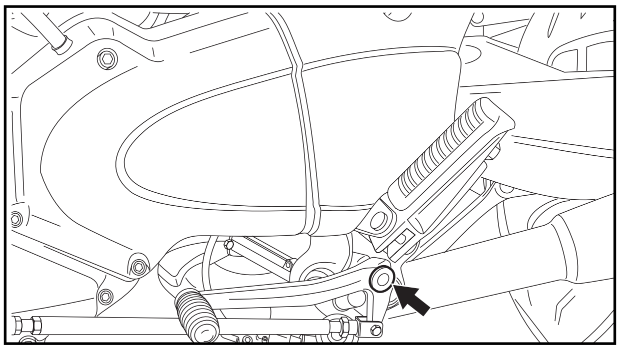
Damaged cable sheaths may causes the cable to corrode and interfere with its movement. Replace damaged cable sheaths and cables as soon as possible.

1. Check:
   - cable sheath
     Damage → Replace.
2. Check:
   - cable operation
     Unsmooth operation → Lubricate.

	Recommended lubricant **Engine oil or a suitable cable lubricant**

NOTE:

Hold the cable end upright and pour a few drops of lubricant into the cable sheath or use a suitable lubing device.

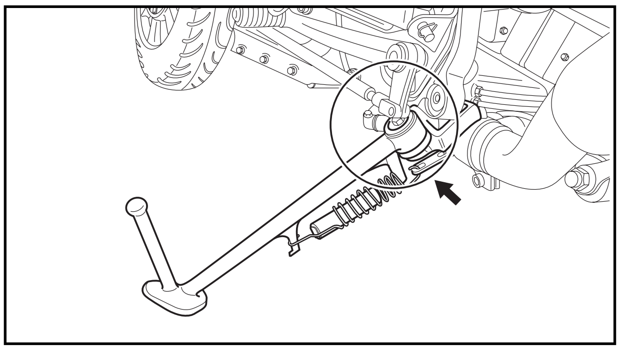


EAS00171

LUBRICATING THE LEVERS AND PEDALS

Lubricate the pivoting point and metal-to-metal moving parts of the levers and pedals.

	Recommended lubricant **Engine oil**



EAS00172

LUBRICATING THE SIDESTAND

Lubricate the pivoting point and metal-to-metal moving parts of the sidestand.

	Recommended lubricant **Engine oil**

EB305020

ELECTRICAL SYSTEM

CHECKING AND CHARGING THE BATTERY

WARNING

Batteries generate explosive hydrogen gas and contain electrolyte which is made of poisonous and highly caustic sulfuric acid. Therefore, always follow these preventive measures:

- **Wear protective eye gear when handling or working near batteries.**
- **Charge batteries in a well-ventilated area.**
- **Keep batteries away from fire, sparks or open flames (e.g., welding equipment, lighted cigarettes).**
- **DO NOT SMOKE when charging or handling batteries.**
- **KEEP BATTERIES AND ELECTROLYTE OUT OF REACH OF CHILDREN.**
- **Avoid bodily contact with electrolyte as it can cause severe burns or permanent eye injury.**

First aid in case of bodily contact:

External

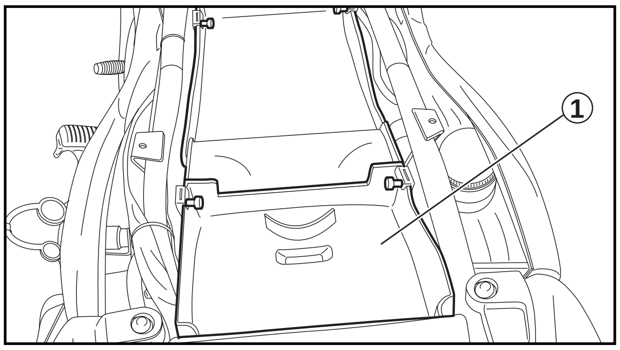
- **SKIN – Wash with water.**
- **EYES – Flush with water for 15 minutes and get immediate medical attention.**

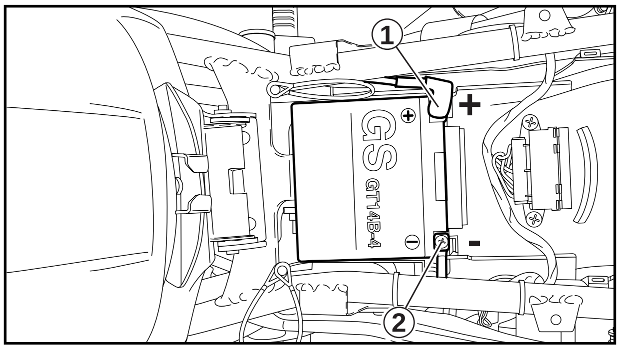
Internal

Drink large quantities of water or milk followed with milk of magnesia, beaten egg or vegetable oil. Get immediate medical attention.

CAUTION:

- **This is a sealed battery. Never remove the sealing caps because the balance between cells will not be maintained and battery performance will deteriorate.**
- **Charging time, charging amperage and charging voltage for a MF battery are different from those of conventional batteries. The MF battery should be charged as explained in the charging method illustrations. If the battery is overcharged, the electrolyte level will drop considerably. Therefore, take special care when charging the battery.**





NOTE:

Since MF batteries are sealed, it is not possible to check the charge state of the battery by measuring the specific gravity of the electrolyte. Therefore, the charge of the battery has to be checked by measuring the voltage at the battery terminals.

1. Remove:
   - seat
   - storage compartment ①
2. Disconnect:
   - battery leads
     (from the battery terminals)

CAUTION:

First, disconnect the negative lead ①, then the positive lead ②.

3. Remove:
   - battery
4. Check:
   - battery charge

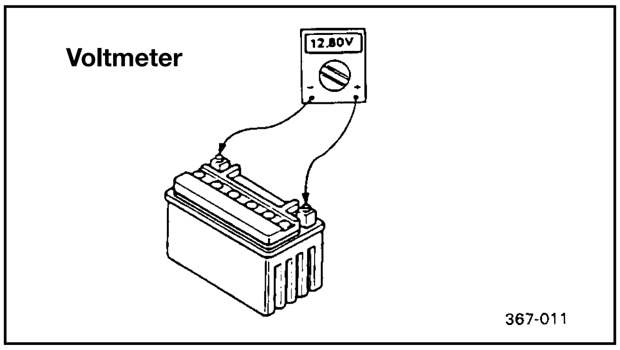
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a. Connect a pocket tester to the battery terminals.

Tester positive lead →	**Battery positive terminal**
Tester negative lead →	**Battery negative terminal**

NOTE:

- The charge state of a MF battery can be checked by measuring its open-circuit voltage (i.e., the voltage when the positive terminal is disconnected).
- No charging is necessary when the open-circuit voltage equals or exceeds 12.8 V.

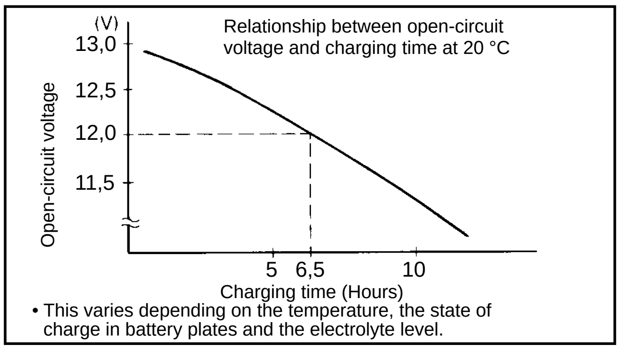


b. Check the charge of the battery, as shown in the charts and the following example.

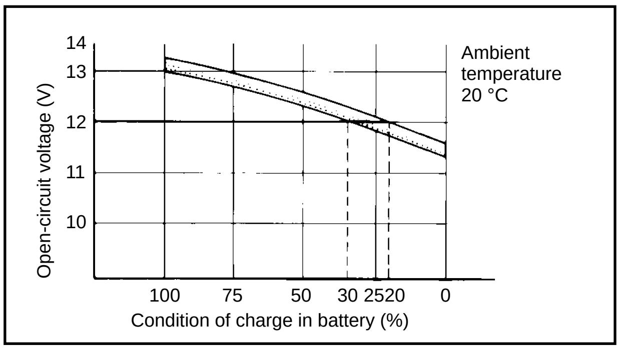
Example

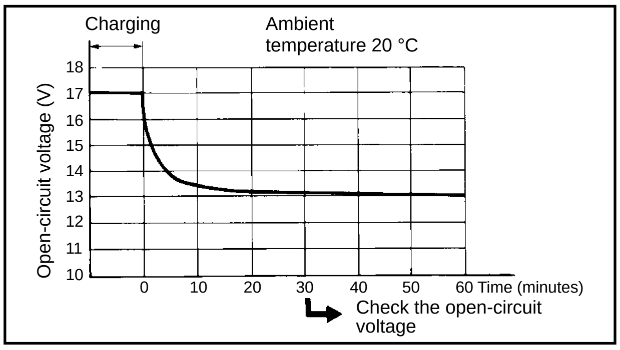
c. Open-circuit voltage = 12.0 V
d. Charging time = 6.5 hours
e. Charge of the battery = 20 ~ 30 %

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5. Charge:
   - battery
     (refer to the appropriate charging method illustration)





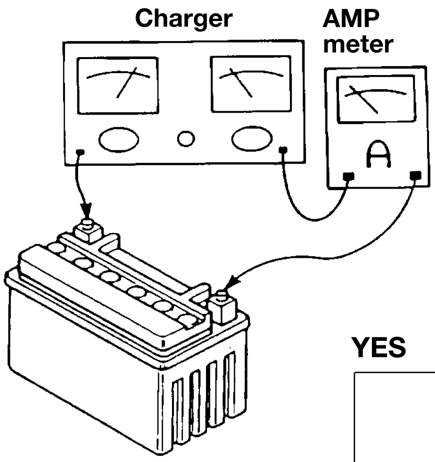
WARNING

Do not quick charge a battery.

CAUTION:

- **Make sure that the battery breather hose and battery vent are free of obstructions.**
- **Never remove the MF battery sealing caps.**
- **Do not use a high-rate battery charger. They force a high-amperage current into the battery quickly and can cause battery overheating and battery plate damage.**
- **If it is impossible to regulate the charging current on the battery charger, be careful not to overcharge the battery.**
- **When charging a battery, be sure to remove it from the motorcycle (if charging has to be done with the battery mounted on the motorcycle, disconnect the negative lead from the battery terminal).**
- **To reduce the chance of sparks, do not plug in the battery charger until the battery charger leads are connected to the battery.**
- **Before removing the battery charger lead clips from the battery terminals, be sure to turn off the battery charger.**
- **Make sure that the battery charger lead clips are in full contact with the battery terminal and that they are not shorted. A corroded battery charger lead clip may generate heat in the contact area and a weak clip spring may cause sparks.**
- **If the battery becomes hot to the touch at any time during the charging process, disconnect the battery charger and let the battery cool before reconnecting it. Hot batteries can explode!**
- **As shown in the following illustration, the open-circuit voltage of a MF battery stabilizes about 30 minutes after charging has been completed. Therefore, wait 30 minutes after charging is completed before measuring the open-circuit voltage.**

Charging method using a variable-current (voltage) type charger



Measure the open-circuit voltage prior to charging.

NOTE:
Voltage should be measured 30 minutes after the machine is stopped.

↓

Connect a charger and AMP meter to the battery and start charging.

NOTE:
Set the charging voltage at 16 ~ 17 V (if the setting is lower, charging will be insufficient. If too high, the battery will be over-charged.)

↓

Make sure the current is higher than the standard charging current written on the battery.

- **YES** → Adjust the voltage so that current is at standard charging level.
- **NO** → By turning the charging voltage adjust dial, set the charging voltage at 20 ~ 25 V.
  - ↓ Monitor the amperage for 3 ~ 5 minutes to check if the standard charging current is reached.
    - **YES** → Adjust the voltage so that current is at standard charging level.
    - **NO** → If the current does not exceed standard charging current after 5 minutes, replace the battery.

Adjust the voltage so that current is at standard charging level.

↓

Set the timer according to the charging time suitable for the open-circuit voltage.
Refer to "Battery condition checking steps."

↓

In case that charging requires more than 5 hours, it is advisable to check the charging current after a lapse of 5 hours.
If there is any charge in the amperage, readjust the voltage to obtain the standard charging current.

↓

Measure the battery open-circuit voltage after having left the battery unused for more than 30 minutes.
12.8 V or more --- Charging is complete.
12.7 V or less --- Recharging is required.
Under 12.0 V --- Replace the battery.

Charging method using a constant-voltage type charger

Measure the open-circuit voltage prior to charging.

NOTE:
Voltage should be measured 30 minutes after the machine is stopped.

↓

Connect a charger and AMP meter to the battery and start charging.

↓

Make sure the current is higher than the standard charging current written on the battery.

YES →

Charge the battery until the battery's charging voltage is 15 V.

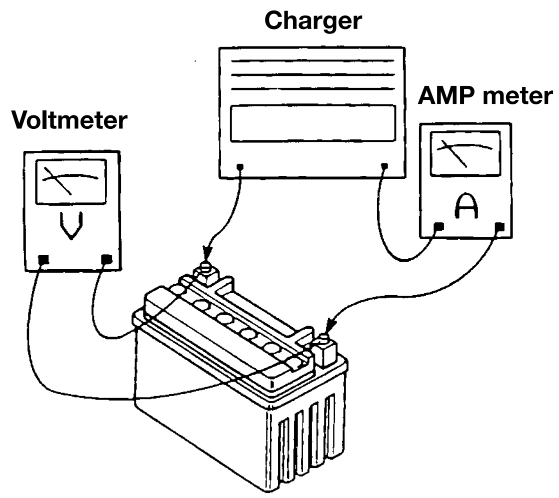
NOTE:
Set the charging time at 20 hours (maximum).

↓

Measure the battery open-circuit voltage after having left the battery unused for more than 30 minutes.
12.8 V or more --- Charging is complete.
12.7 V or less --- Recharging is required.
Under 12.0 V --- Replace the battery.

NO →

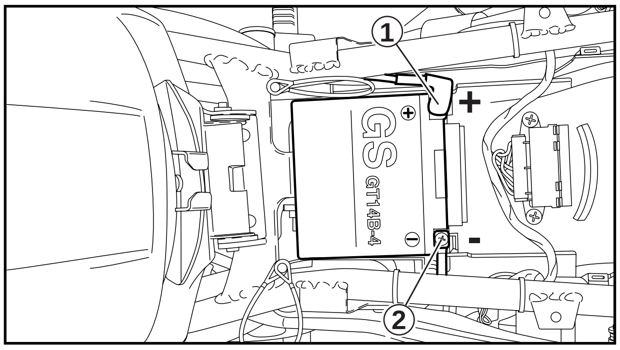
This type of battery charger cannot charge the MF battery. A variable voltage charger is recommended.



Charging method using a constant-current type charger

This type of battery charger cannot charge the MF battery.

6. Check:
   - battery breather hose
     Obstruction → Clean.



7. Connect:
   - battery leads
     (to the battery terminals)

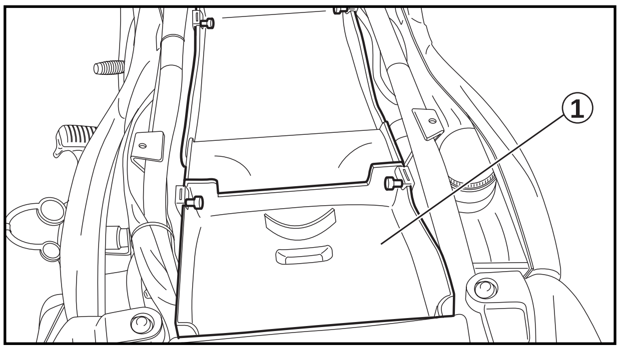
CAUTION:

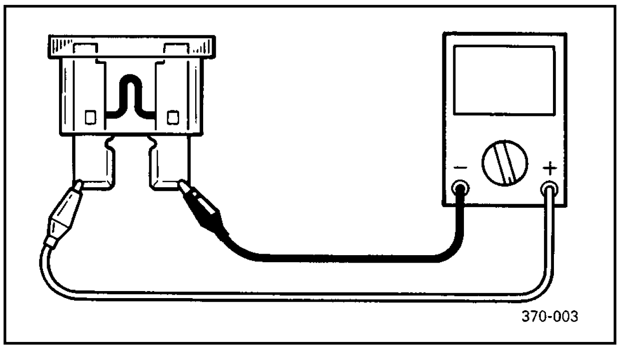
First, connect the positive lead ①, then the negative lead ②.

8. Check:
   - battery terminals
     Dirt → Clean with a wire brush.
     Loose connection → Connect properly.
9. Lubricate:
   - battery terminals

	Recommended lubricant **Dielectric grease**

10. Install:
    - storage compartment
    - seat





EAS00181

CHECKING THE FUSES

The following procedure applies to all of the fuses.

CAUTION:

To avoid a short circuit, always turn the main switch to "OFF" when checking or replacing a fuse.

1. Remove:
   - seat
   - storage compartment ①
2. Check:
   - fuse

▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼

a. Connect the pocket tester to the fuse and check it for continuity.

NOTE:

Set the pocket tester selector to "Ω × 1".

Pocket tester
90890-03112

b. If the pocket tester indicates "∞", replace the fuse.

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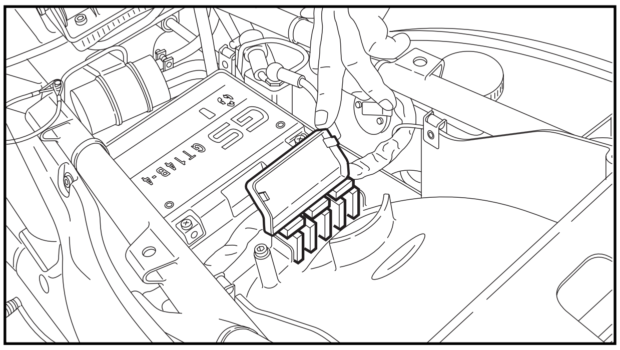
3. Replace:
   - blown fuse

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a. Turn off the ignition.
b. Install a new fuse of the correct amperage rating.
c. Turn on the switches to verify if the electrical circuit is operational.
d. If the fuse immediately blows again, check the electrical circuit.

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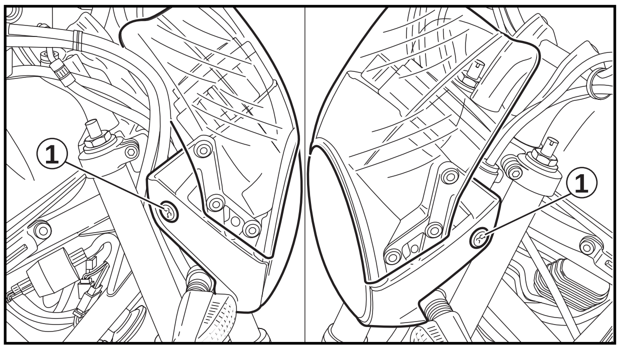
Fuses	Amperage rating	Quantity
Main	30 A	1
Back up	5 A	1
Ignition	10 A	1
Headlight	15 A	1
Carburetor heater	15 A	1
Signals	10 A	1
Reserve	30 A	1
Reserve	15 A	1
Reserve	10 A	1
Reserve	5 A	1



⚠ WARNING

Never use a fuse with an amperage rating other than that specified. Improvising or using a fuse with the wrong amperage rating may cause extensive damage to the electrical system, cause the lighting and ignition systems to malfunction and could possibly cause a fire.

4. Install:
   - storage compartment
   - seat

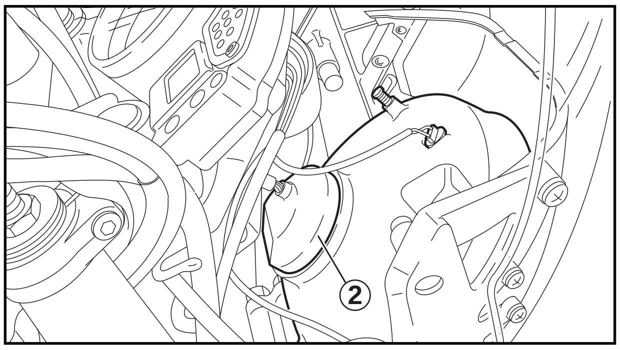


EAS00182

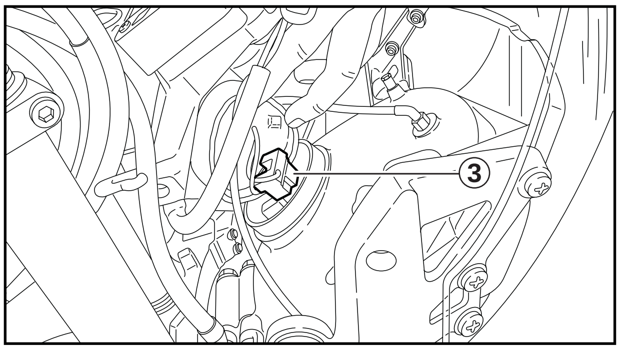
REPLACING THE HEADLIGHT BULB

Headlight

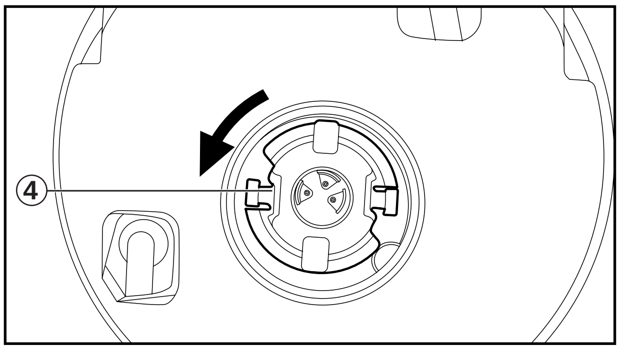
1. Remove:
   - cowling screws ①
     (tilt the cowling forward)



2. Remove:
   - headlight bulb cover ②
3. Disconnect:
   - headlight coupler ③



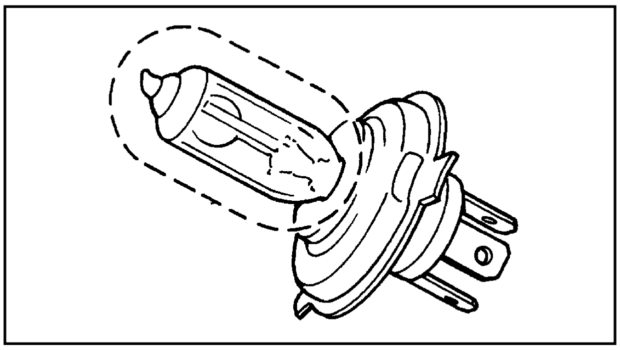
4. Remove:
   - headlight bulb holder ④
5. Remove:
   - headlight bulb



⚠ WARNING

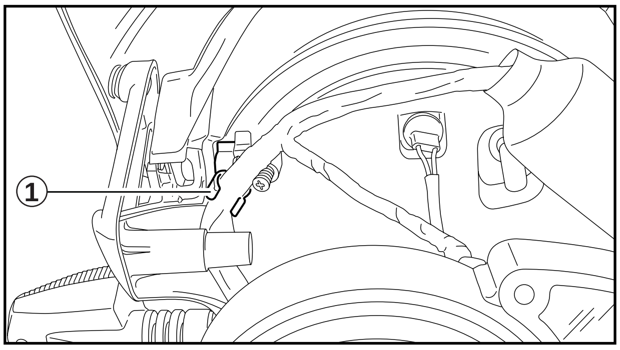
Since the headlight bulb gets extremely hot, keep flammable products and your hands away from the bulb until it has cooled down.

6. Install:
   - headlight bulb (new)
     Secure the new bulb with the bulb holder.



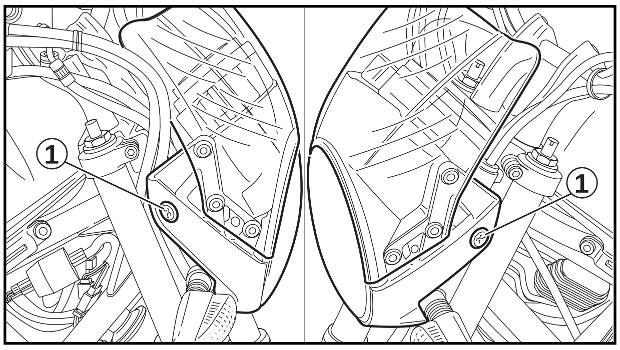
CAUTION:

Avoid touching the glass part of the headlight bulb to keep it free from oil, otherwise the transparency of the glass, the life of the bulb and the luminous flux will be adversely affected. If the headlight bulb gets soiled, thoroughly clean it with a cloth moistened with alcohol or lacquer thinner.



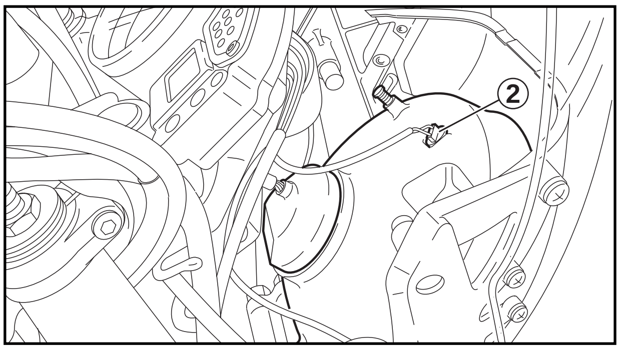
7. Install:
   - headlight bulb holder
8. Connect:
   - headlight coupler
9. Install:
   - headlight bulb cover
   - cowling

NOTE:
Before installing the headlight, be sure to hook the headlight and auxiliary light bulb leads into the guide ① to the left of the headlight as shown.

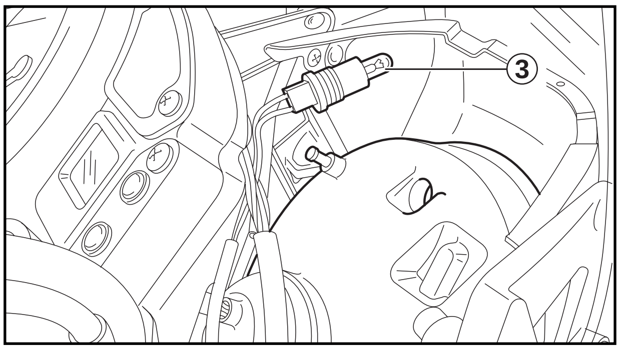


Auxiliary light

1. Remove:
   - cowling screws ①
     (tilt the cowling forward)

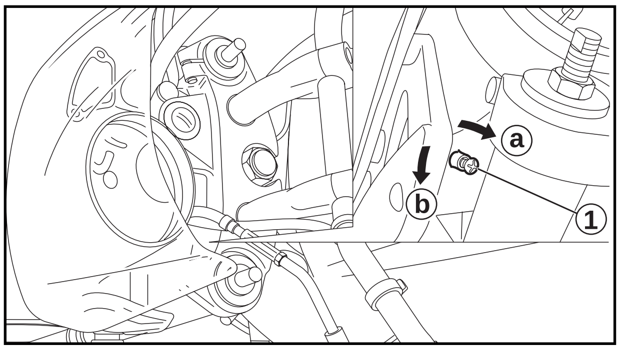


2. Remove:
   - auxiliary light bulb holder ②
   - auxiliary light bulb ③



3. Install:
   - auxiliary light bulb (into the bulb holder)
   - auxiliary light bulb holder (into the headlight)
   - cowling

NOTE:
Before installing the headlight, be sure to hook the headlight and auxiliary light bulb leads into the guide to the left of the headlight as shown.



EASB0013

ADJUSTING THE HEADLIGHT BEAM

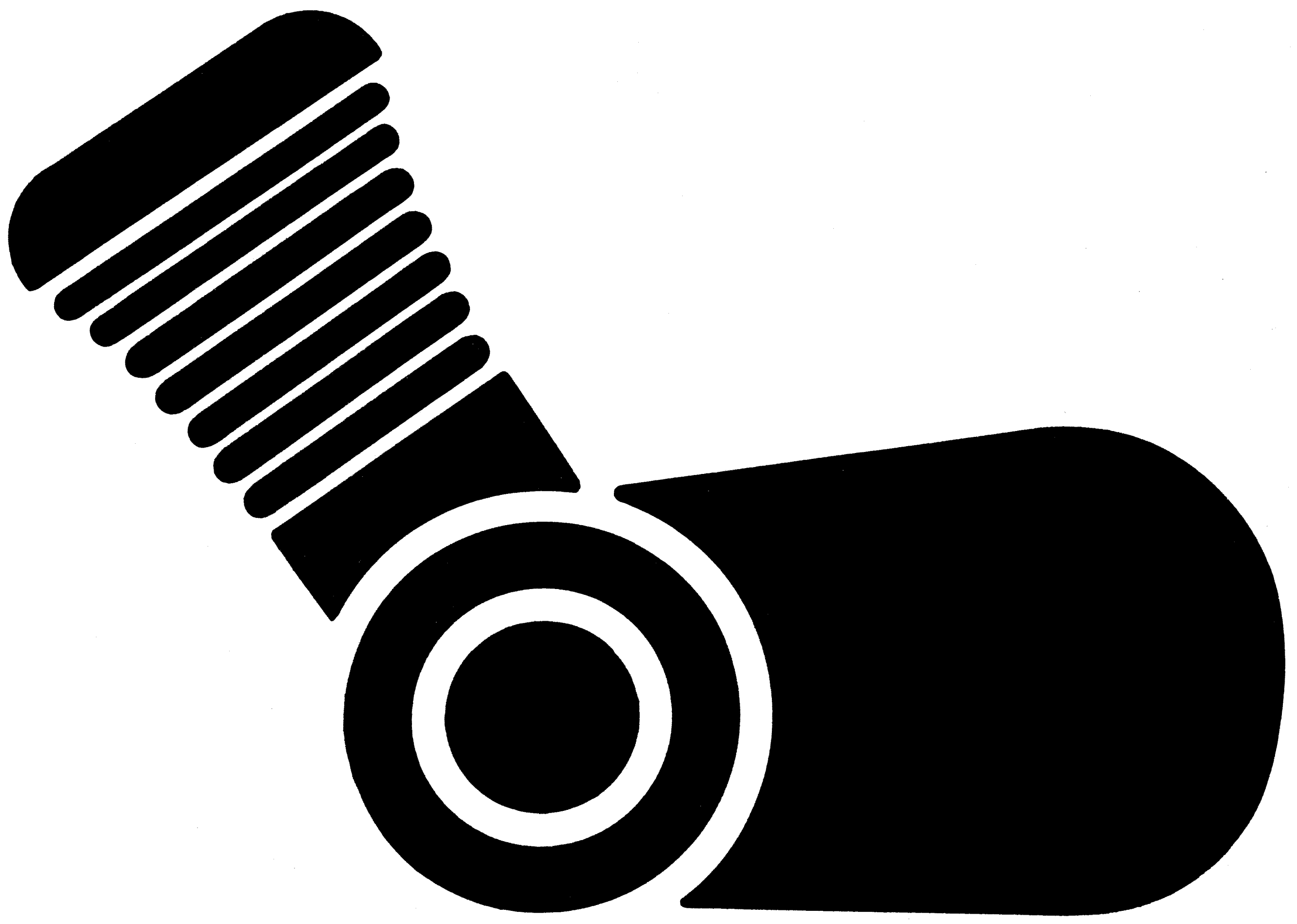
1. Adjust:
   • headlight beam (vertically)

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a. Turn the adjusting screw ① in direction ⓐ or ⓑ.

Direction ⓐ →	**Headlight beam is raised.**
Direction ⓑ →	**Headlight beam is lowered.**

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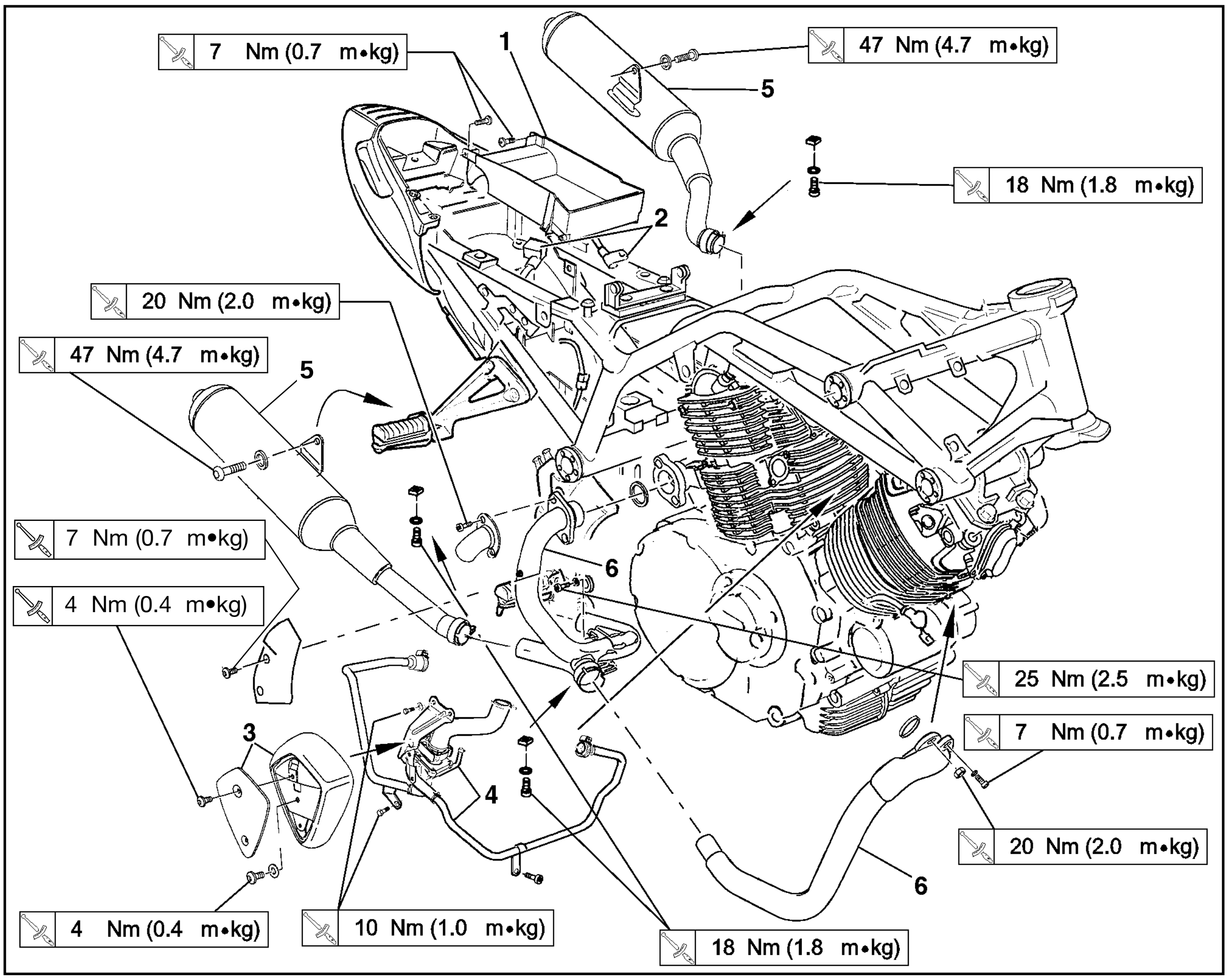
ENG 4

CHAPTER 4.
ENGINE

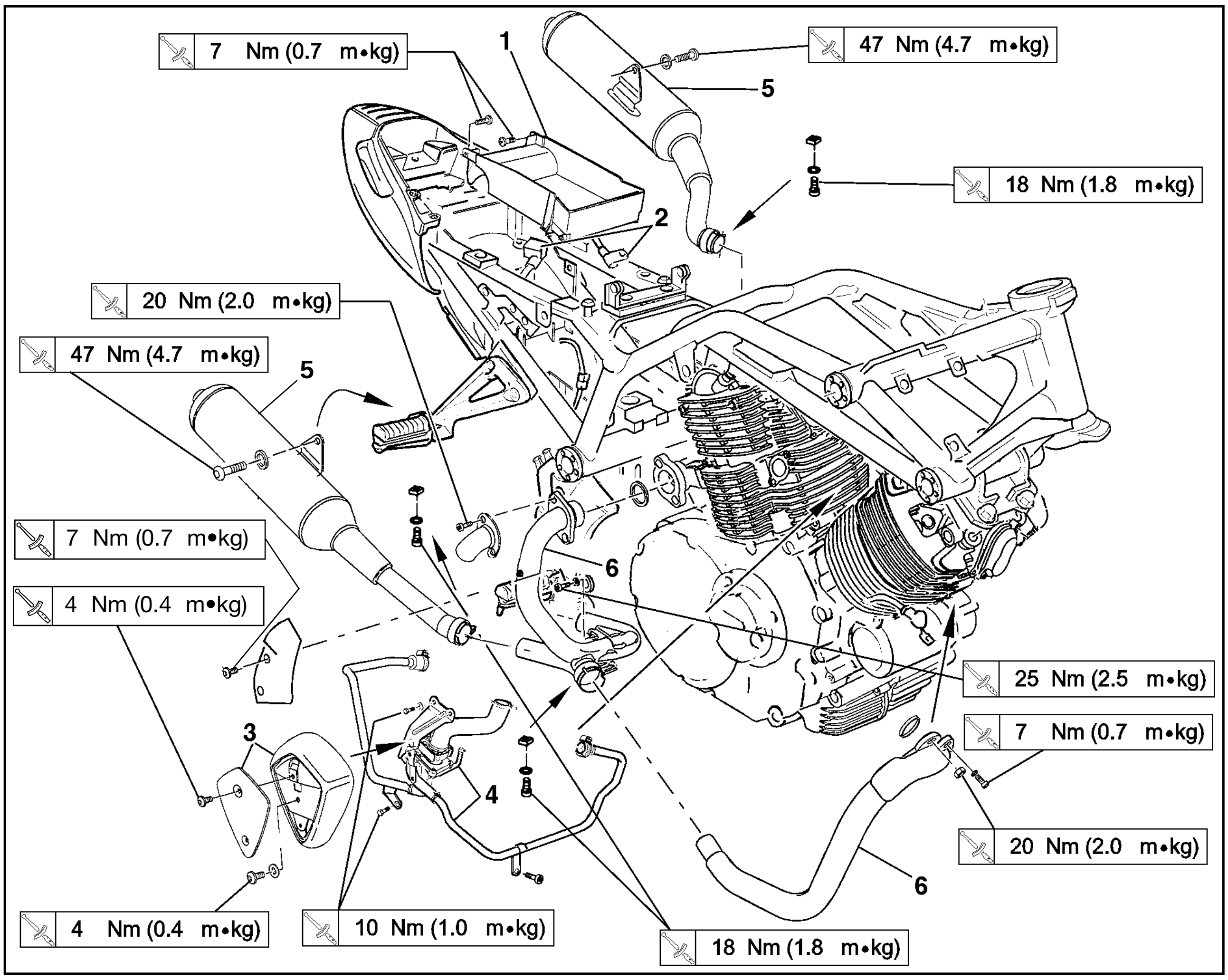
ENGINE

ENGINE REMOVAL

SEAT, STORAGE COMPARTMENT, SIDE COVERS, FUEL TANK, AIR FILTER CASE ASSEMBLY, CARBURETOR ASSEMBLY AND EXHAUST SYSTEM

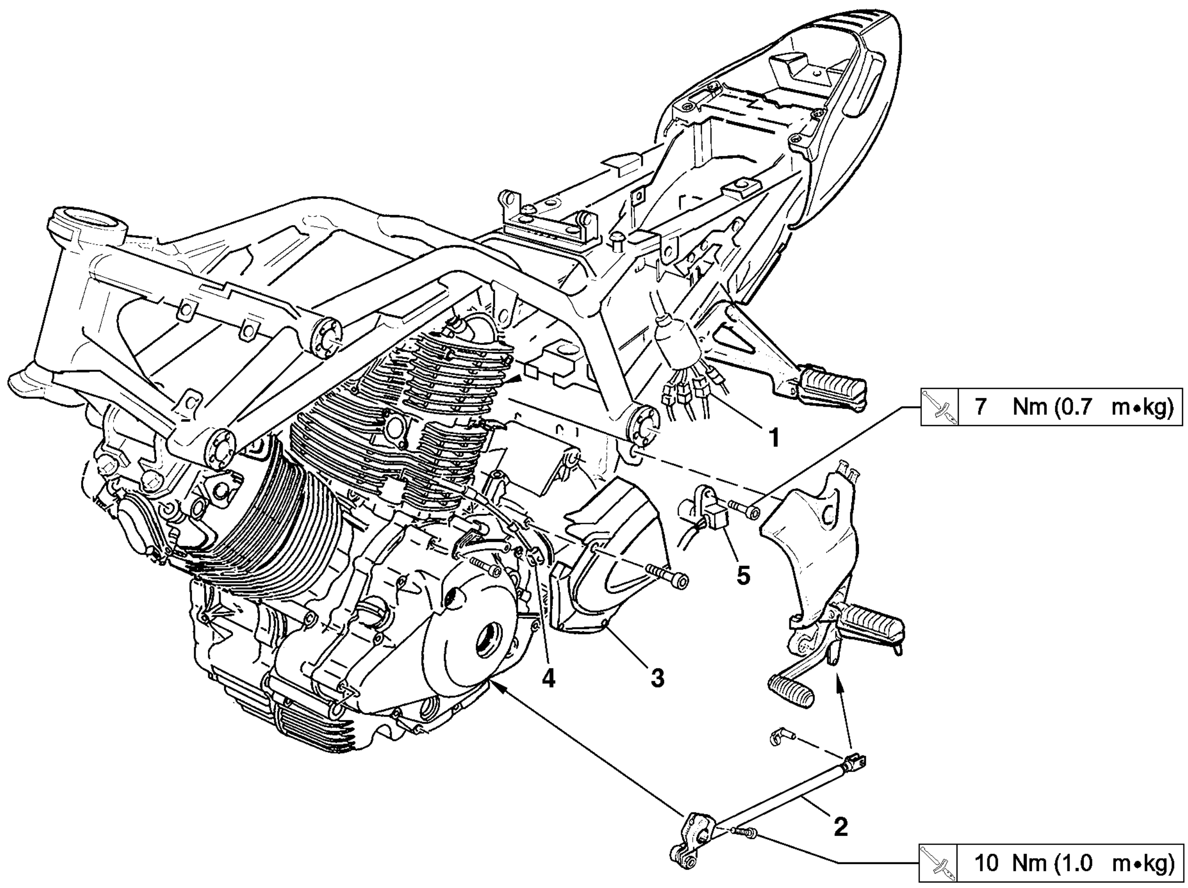


Order	Job name/Part name	Q'ty	Remarks
	Removing the seat, storage compartment, side covers, fuel tank, air filter case assembly, carburetor assembly and exhaust system		Remove the parts in the order listed. Stand the motorcycle on a level surface. **⚠ WARNING** **Securely support the motorcycle so there is no danger of it falling over.**
	Seat		
1	Storage compartment	1	



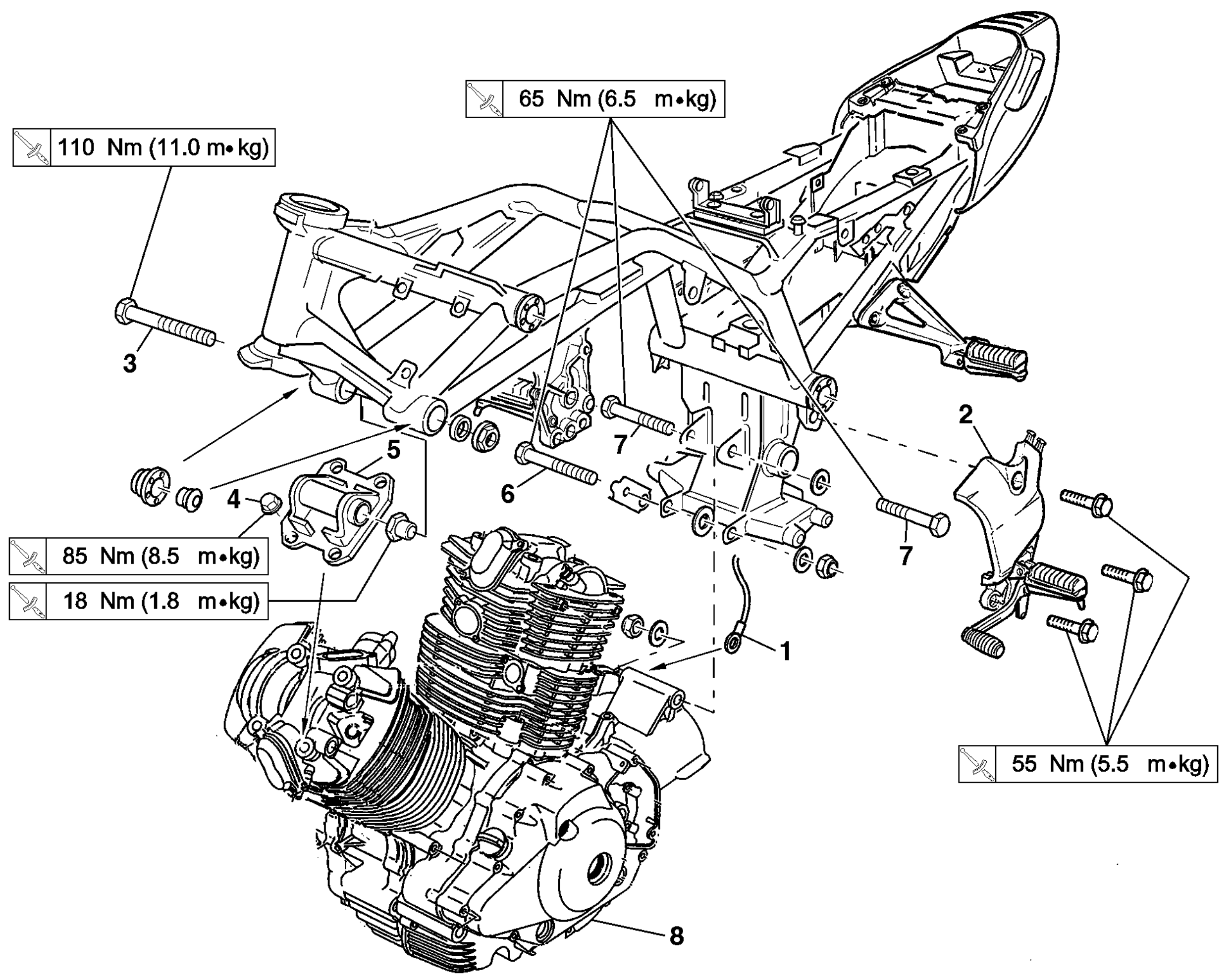
Order	Job name/Part name	Q'ty	Remarks
2	Battery leads	2	Disconnect **NOTE:** First, disconnect the negative lead, then disconnect the positive lead.
	Side covers Fuel tank		Refer to "SEAT, SIDE COVERS AND FUEL TANK" in Chapter 3.
	Air filter case assembly Carburetor assembly		Refer to "CARBURETOR" in Chapter 5.
3	A.I.S. system cover	1	
4	A.I.S. system	1	
5	Muffler assembly	2	
6	Exhaust pipes	2	For installation, reverse the removal procedure.

LEADS, SHIFT PEDAL AND CLUTCH CABLE

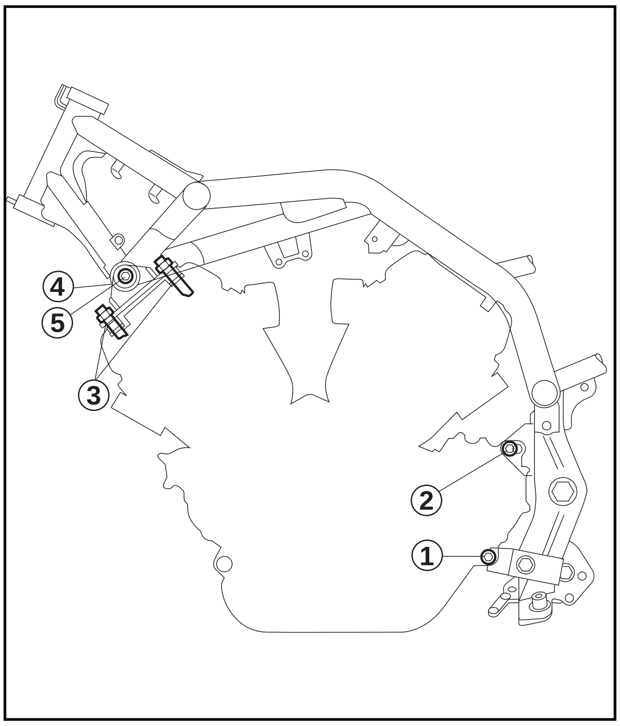


Order	Job name/Part name	Q'ty	Remarks
	Removing the leads, shift pedal and clutch cable		Remove the parts in the order listed.
1	AC magneto lead/pickup lead/ side stand switch lead/ speed sensor lead/ neutral switch lead	1/1/1/1	Disconnect
2	Shift rod	1	Refer to "INSTALLING THE ENGINE".
3	Clutch adjusting cover	1	
4	Clutch cable	1	Disconnect **NOTE:** First, remove the shift rod from shift pedal, then remove the shift arm from engine.
5	Speed sensor	1	
			For installation, reverse the removal procedure.

ENGINE MOUNTING BOLTS



Order	Job name/Part name	Q'ty	Remarks
	Engine mounting bolt removal		Remove the parts in the order below. Place a suitable stand under the frame and engine. Lift the front fork upper bracket.
1	Engine ground lead connector	1	Disconnect
2	Main footrest brackets	2	
3	Engine stay bolt (upper)	1	**CAUTION:**
4	Engine stay nut (upper)	4	
5	Engine stay (upper)	1	**Install the Ø 12mm washer under the head of bolt ⑦.**
6	Engine mount bolt (rear lower)	1	
7	Engine mount bolts (rear upper)	2	
8	Engine assembly	1	Refer to "INSTALLING THE ENGINE". For installation, reverse the removal procedure.



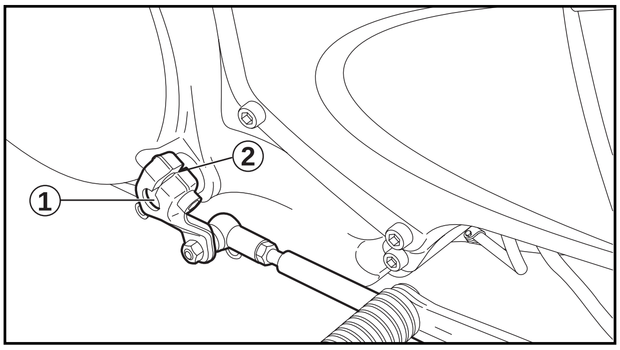
EASB0014
INSTALLING THE ENGINE

1. Tighten the bolts in the following order:

> **Bolt ①:**
> **65 Nm (6.5 m•kg)**
> **Bolt ②:**
> **65 Nm (6.5 m•kg)**
> **Nut ③:**
> **85 Nm (8.5 m•kg)**
> **Special screw ④:**
> **18 Nm (1.8 m•kg)**
> **Bolt ⑤:**
> **110 Nm (11.0 m•kg)**

CAUTION:

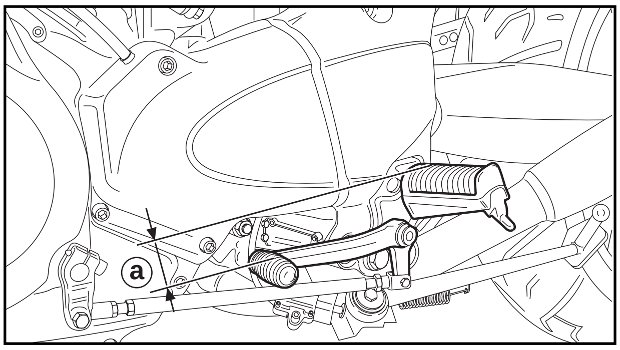
Install the Ø 12mm washer under the head of bolt ②.



2. Install:
   - shift arm ①

NOTE:
- Align the punch mark in the shift shaft with the slot ② in the shift arm
- Install the shift rod joint pin in the shift pedal. Refer to "ADJUSTING THE SHIFT PEDAL" in Chapter 3.

> **Shift arm bolt**
> **10 Nm (1.0 m•kg)**

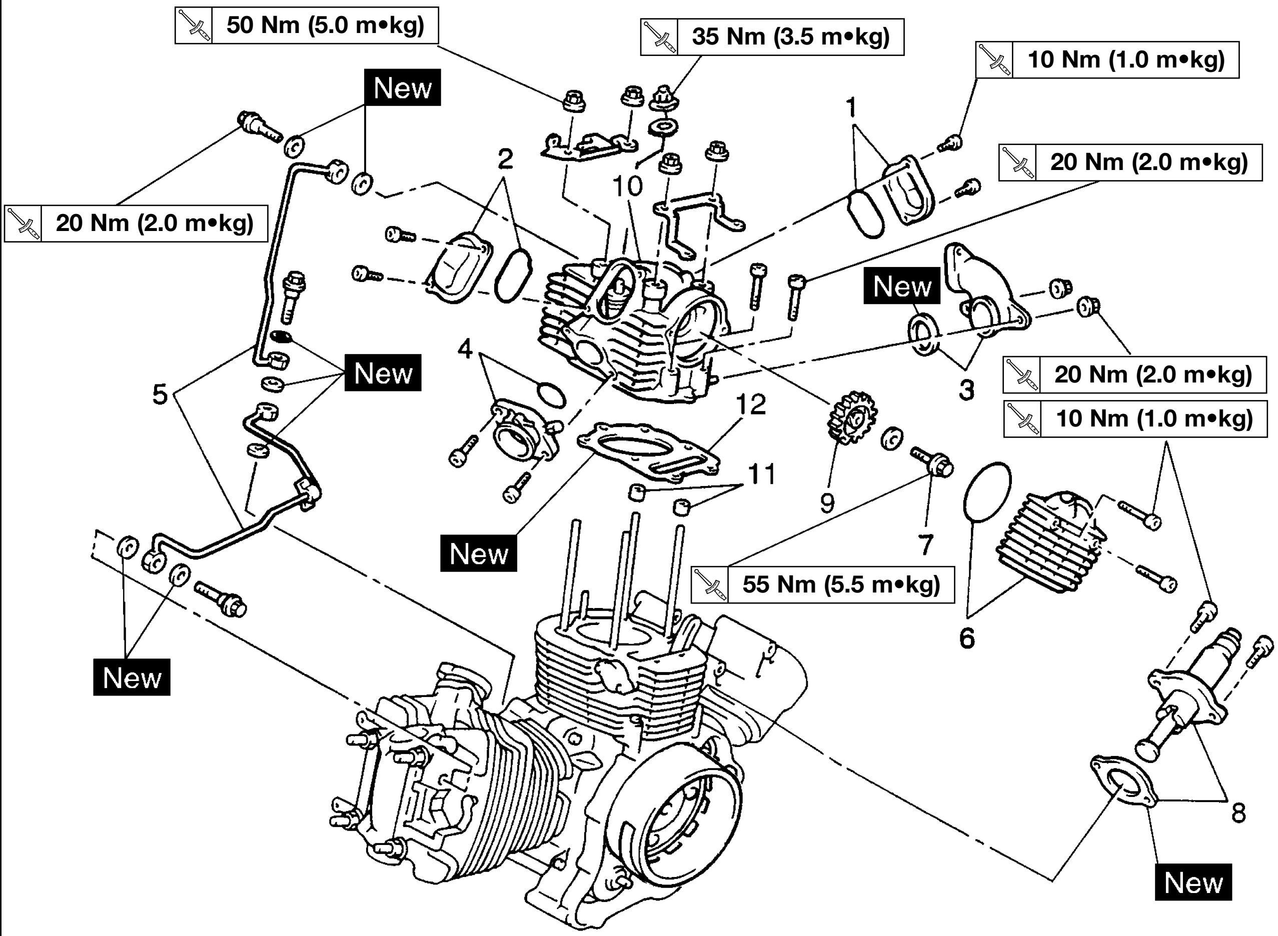


3. Check:
   - shift pedal position
     (distance ⓐ from the top of the rider footrest to the top of the shift pedal)
     Out of specification → Adjust.

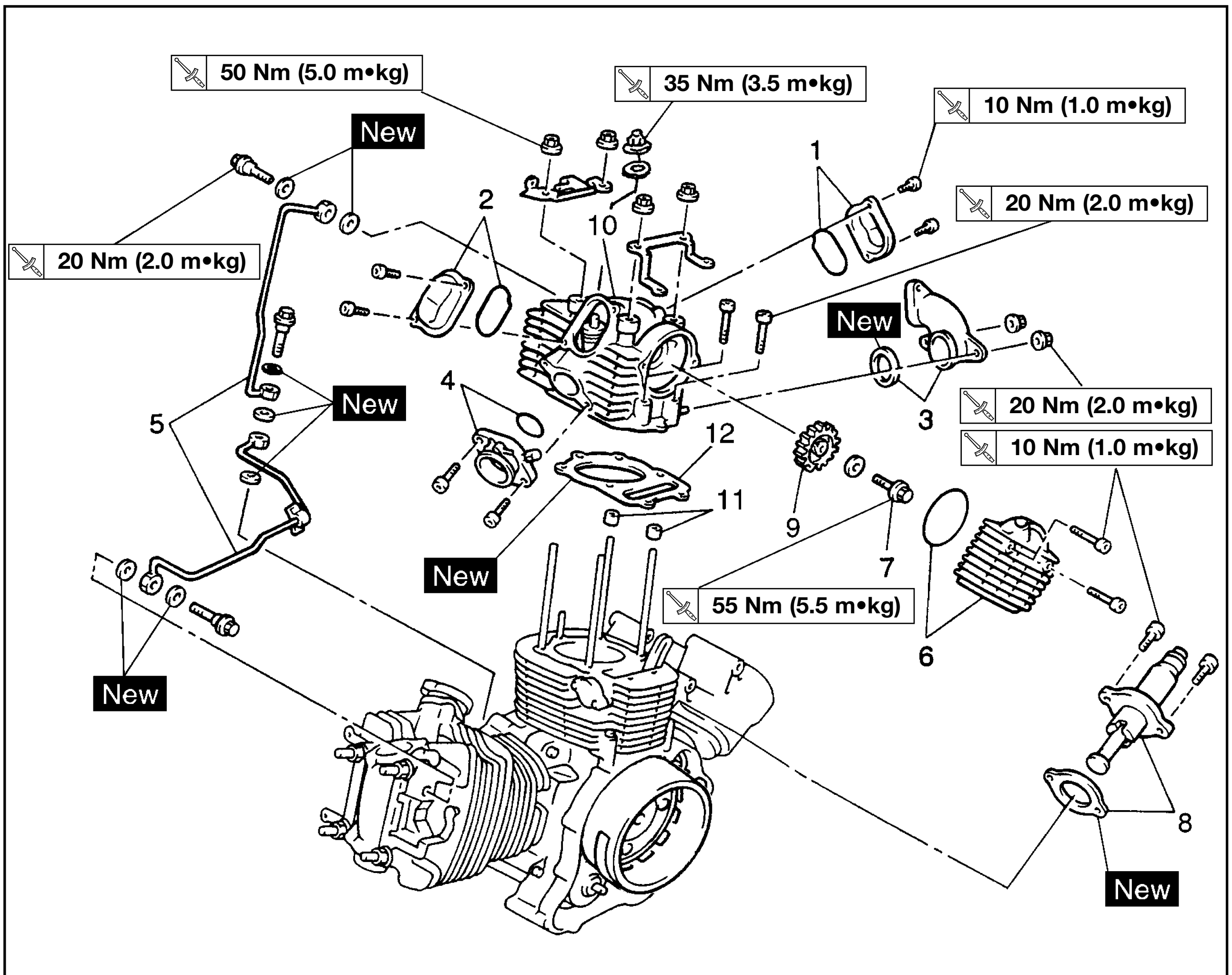
> **Shift pedal position**
> **(below the top of the rider footrest)**
> **45 mm**

CYLINDER HEADS

REAR CYLINDER HEAD

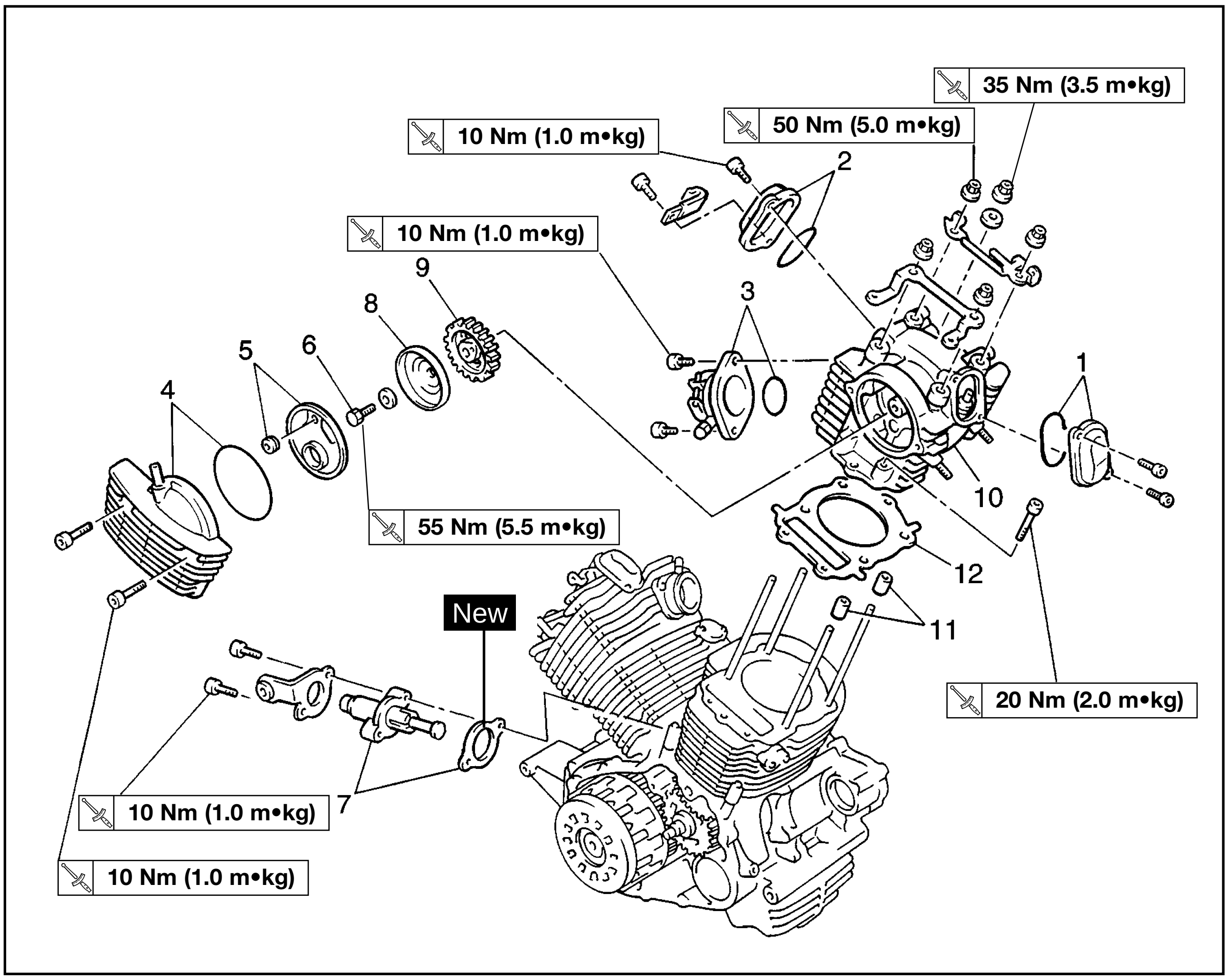


Order	Job name/Part name	Q'ty	Remarks
	Cylinder head removal		Remove the parts in the order listed.
	Engine assembly		Refer to "ENGINE REMOVAL".
1	Tappet cover (exhaust)/O-ring	1/1	
2	Tappet cover (intake)/O-ring	1/1	
3	Exhaust pipe joint/gasket	1/1	
4	Carburetor joint/O-ring	1/1	
5	Oil delivery pipes	2	
6	Camshaft sprocket cover/O-ring	1/1	Refer to "INSTALLING THE CYLINDER HEADS".
7	Camshaft sprocket bolt	1	

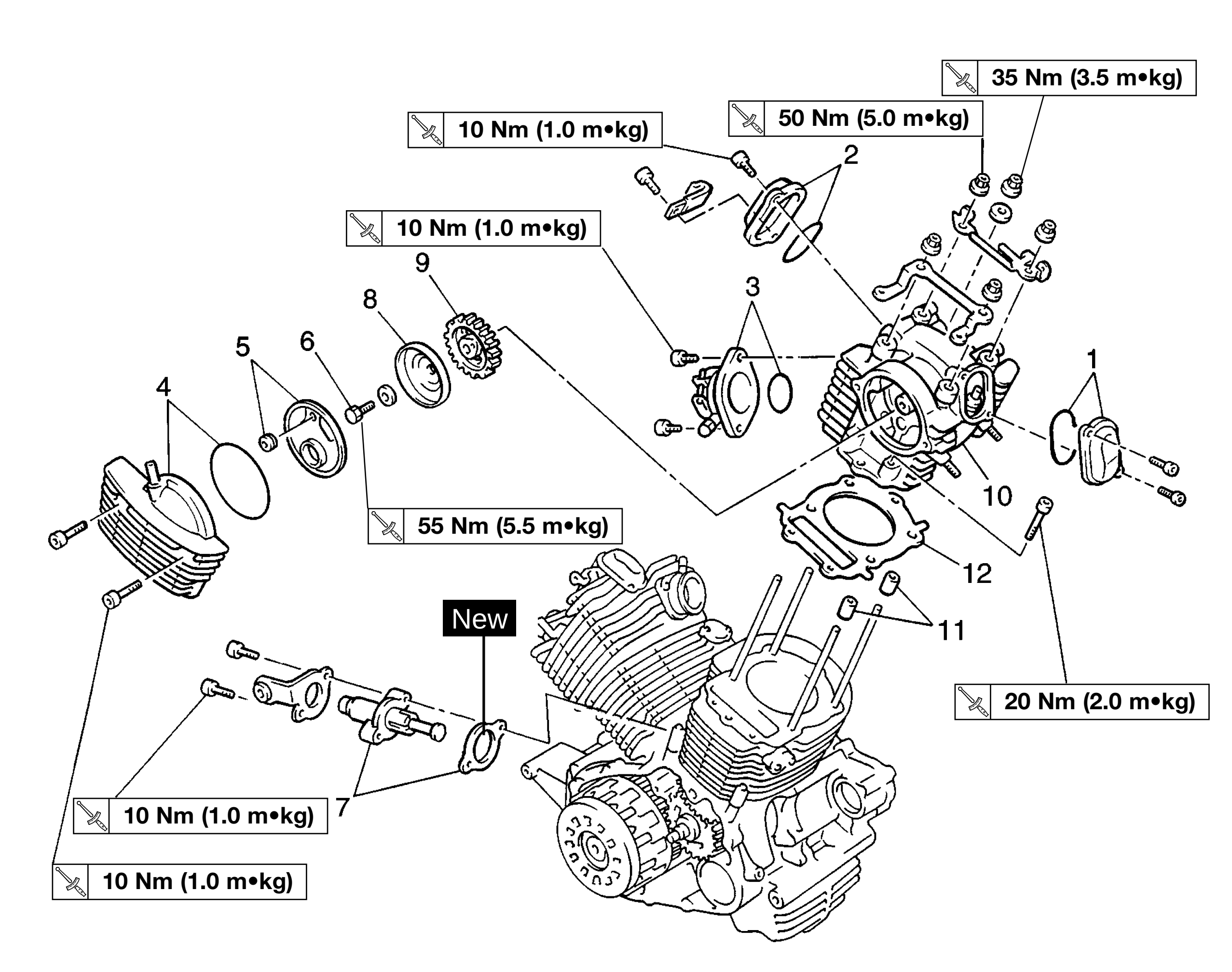


Order	Job name/Part name	Q'ty	Remarks
8	Timing chain tensioner/gasket	1/1	Refer to "REMOVING/INSTALLING THE CYLINDER HEADS".
9	Camshaft sprocket	1	
10	Cylinder head	1	
11	Dowel pins	2	Refer to "INSTALLING THE CYLINDER HEADS".
12	Cylinder head gasket	1	For installation, reverse the removal procedure.

FRONT CYLINDER HEAD



Order	Job name/Part name	Q'ty	Remarks
	Cylinder head removal		Remove the parts in the order listed.
	Engine assembly		Refer to "ENGINE REMOVAL".
	Oil delivery pipes		Refer to "REAR CYLINDER HEAD".
	Right crankcase cover		Refer to "CLUTCH".
1	Tappet cover (exhaust)/O-ring	1/1	
2	Tappet cover (intake)/O-ring	1/1	
3	Carburetor joint/O-ring	1/1	
4	Camshaft sprocket cover/O-ring	1/1	Refer to "INSTALLING THE CYLINDER HEADS".
5	Baffle plate/O-ring	1/1	
6	Camshaft sprocket bolt	1	



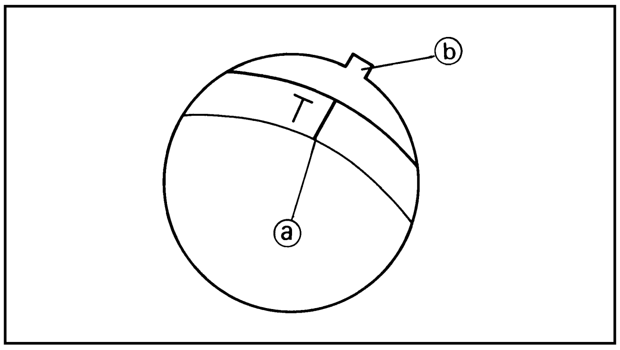
Order	Job name/Part name	Q'ty	Remarks
7	Timing chain tensioner/gasket	1/1	Refer to "REMOVING/INSTALLING THE CYLINDER HEADS".
8	Camshaft sprocket plate	1	
9	Camshaft sprocket	1	
10	Cylinder head	1	
11	Dowel pins	2	Refer to "INSTALLING THE CYLINDER HEADS".
12	Cylinder head gasket	1	
			For installation reverse the removal procedure.

EAS00226

REMOVING THE CYLINDER HEADS

Rear cylinder head

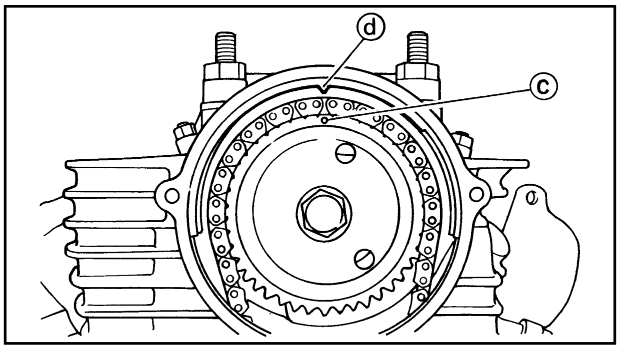
1. Remove:
   - camshaft sprocket cover
   - tappet covers



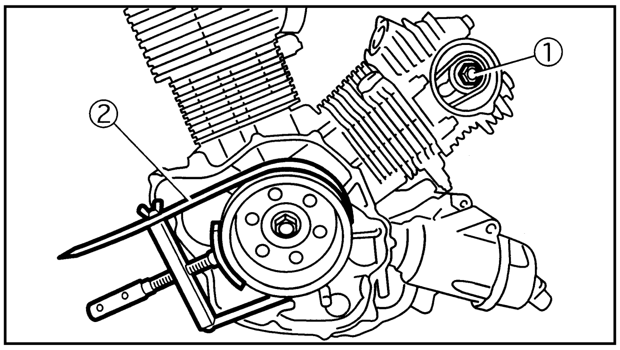
2. Align:
   - "T" mark ⓐ (with the stationary pointer ⓑ)

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a. Temporarily install the left crankcase cover without the pickup coil and stator coil.
b. Turn the crankshaft clockwise.
c. Align the "T" mark ⓐ with the stationary pointer ⓑ on the crankcase cover (left) when the rear piston is at TDC on the compression stroke.
d. Check that the rear piston is at TDC in the compression stroke.
e. The rear piston is at TDC on the compression stroke when there is clearance at both of the rocker arms. If there is no clearance then turn the crankshaft clockwise one full turn.
f. When to "T" mark is aligned with the stationary pointer the punch mark ⓒ on the camshaft sprocket should be aligned with the stationary pointer ⓓ on the cylinder head.



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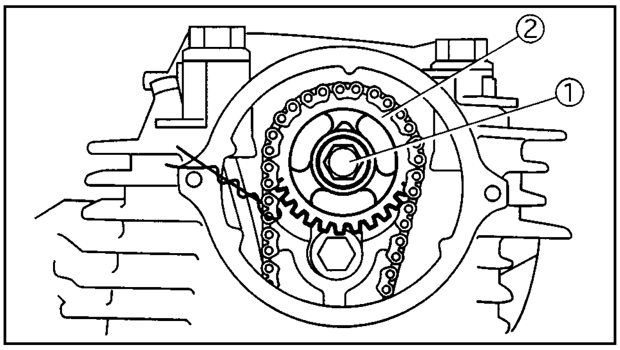


3. Loosen:
   - bolt (camshaft sprocket) ①

NOTE:

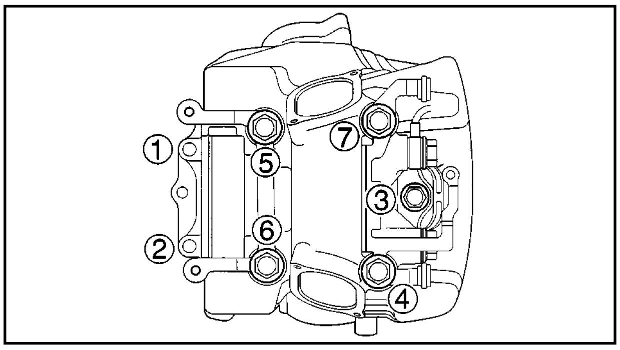
Use the sheave holder ② to hold the rotor.

Sheave holder:
90890-01701



4. Remove:
   - timing chain tensioner
   - gasket
5. Remove:
   - bolt (camshaft sprocket) ①
   - camshaft sprocket ②

NOTE:
To prevent the timing chain from falling into the crankcase fasten a wire to it.



6. Remove:
   - cylinder head

NOTE:
- Loosen the bolts and nuts in the proper sequence.
- Follow the numerical order shown in the illustration. Loosen each bolt 1/4 of a turn at a time until all of the bolts are loose.

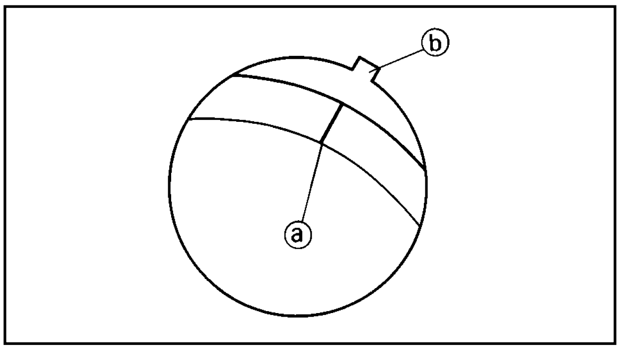
Front cylinder head

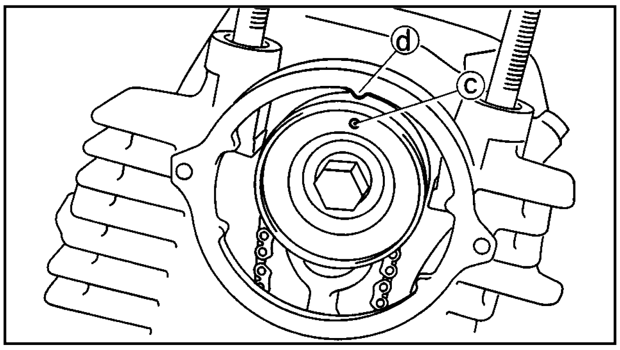
NOTE:
When removing the front cylinder head, repeat the rear cylinder head removal procedures. However, note the following points.

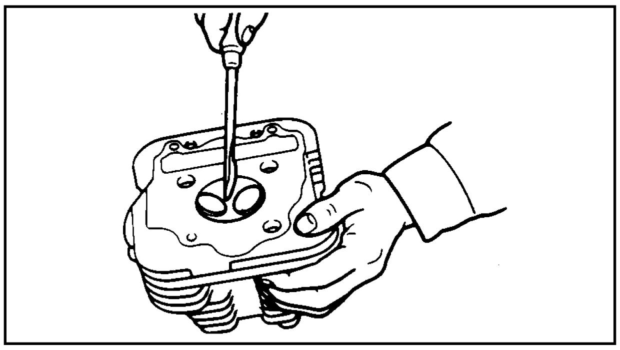
1. Align:
   - "I" mark
     (with the stationary pointer)

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Removal steps:
- Turn the crankshaft clockwise 290°.
- Align the "I" mark ⓐ with the stationary pointer ⓑ on the crankcase cover (left) when the front piston is at TDC on the compression stroke.
- When the "I" mark is aligned with the stationary pointer the punch mark ⓒ on the camshaft sprocket should be aligned with the stationary pointer ⓓ on the cylinder head.
- The front piston is at TDC on the compression stroke when there is clearance at both of the rocker arms.

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EAS00228

CHECKING THE CYLINDER HEADS

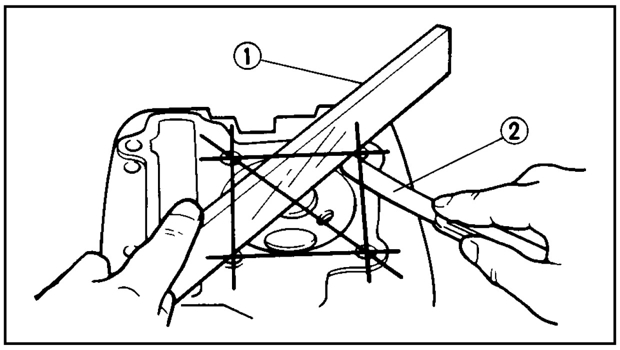
The following procedure applies to all of the cylinder heads.

1. Eliminate:
   - combustion chamber carbon deposits (with a rounded scraper)

NOTE:
Do not use a sharp instrument to avoid damaging or scratching:
- spark plug threads
- valve seats

2. Check:
   - cylinder head
     Damage/scratches → Replace.
3. Measure:
   - cylinder head warpage
     Out of specification → Resurface the cylinder head.

	Cylinder head warpage **Less than 0.03 mm**

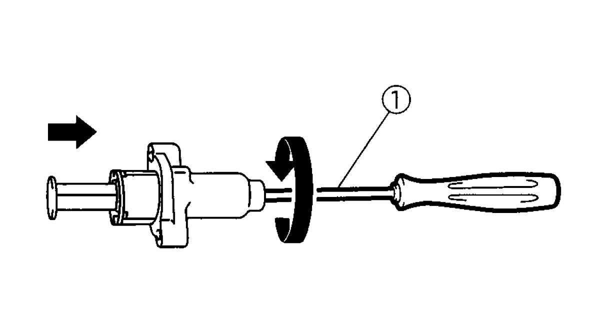


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a. Place a straightedge ① and a thickness gauge ② across the cylinder head.
b. Measure the warpage.
c. If the limited is exceeded, resurface the cylinder head as follows
d. Place 400 – 600 grit wet sandpaper on the surface plate and resurface the cylinder head using a figure-eight sanding pattern.

NOTE:
To ensure an even surface, rotate the cylinder head several times.

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EB401430

CHECKING THE TIMING CHAIN TENSIONER

1. Check:
   - timing chain tensioner
     Cracks/damage/rough movement → Replace.

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a. Lightly press the timing chain tensioner rod into the timing chain tensioner housing by hand.

NOTE:
While pressing the timing chain tensioner rod, wind it clockwise with a thin screwdriver ① until it stops.

b. Remove the screwdriver and slowly release the timing chain tensioner rod.
c. Make sure that the timing chain tensioner rod comes out of the timing chain tensioner housing smoothly. If there is rough movement, replace the timing chain tensioner.

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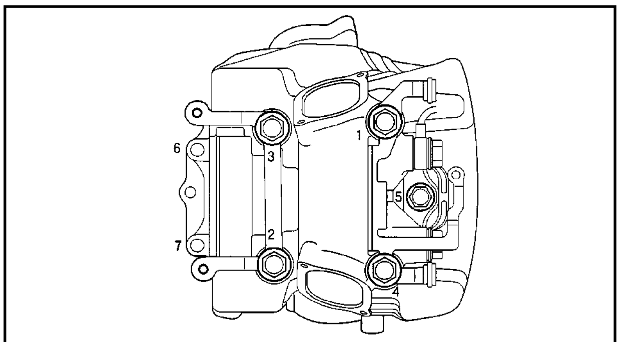
EAS00234

INSTALLING THE CYLINDER HEADS

Rear cylinder head

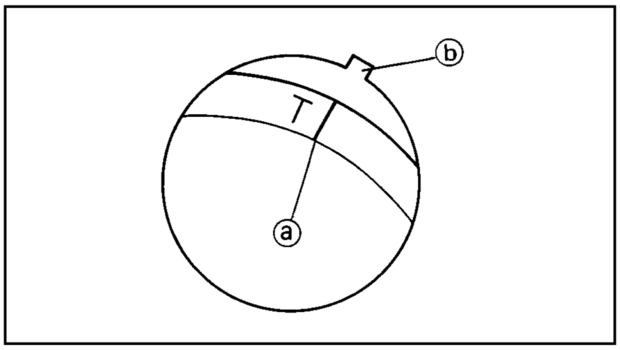
1. Install:
   - dowel pins
   - gasket

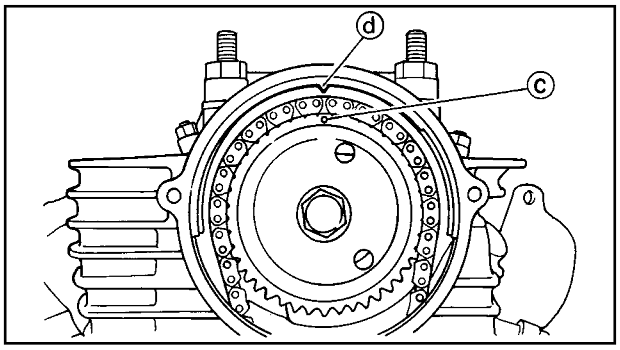
NOTE:
The "5EL" mark on the gasket must face up side of the cylinder.

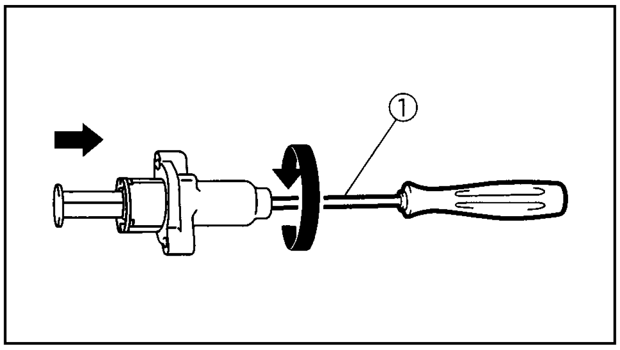


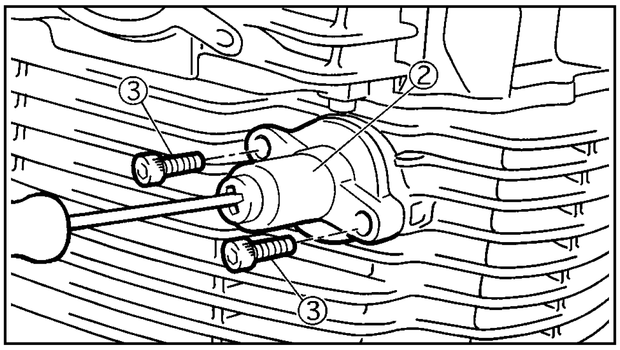
2. Install:
   - nuts (cylinder head) (M12: 1 – 4)
     50 Nm (5.0 m•kg)
   - cap nut (cylinder head) (M10: 5)
     35 Nm (3.5 m•kg)
   - bolts (cylinder head) (M8: 6 – 7)
     20 Nm (2.0 m•kg)

NOTE:
- Tighten the bolts and nuts in the proper sequence.
- Follow the numerical order shown in the illustration. Tighten the bolts and nuts in two stages.









3. Install:
   • camshaft sprocket

a. Temporarily install the rotor nut and left crankcase cover without the pickup coil and stator coil.
b. Turn the crankshaft clockwise.
c. Align the "T" mark ⓐ with the stationary pointer ⓑ on the crankcase cover (left).
d. Install the camshaft sprocket with the timing mark ⓒ facing out.
e. Turn the camshaft just enough to remove any slack from the intake side of the timing chain.
f. Insert your finger into the hole and timing chain tensioner hole and push the timing chain guide inward.
g. While pushing the timing chain guide, be sure that the timing mark ⓒ and the stationary pointer ⓓ are properly aligned at TDC.

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4. Install:
   • timing chain tensioner

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a. Lightly press the timing chain tensioner rod into the timing chain tensioner housing by hand.
b. While pressing the timing chain tensioner rod, wind it clockwise with a thin screwdriver ① until it stops.
c. With the screwdriver still inserted into the timing chain tensioner, install the timing chain tensioner ②, and gasket. Then, tighten the timing chain tensioner bolts ③ to the specified torque.

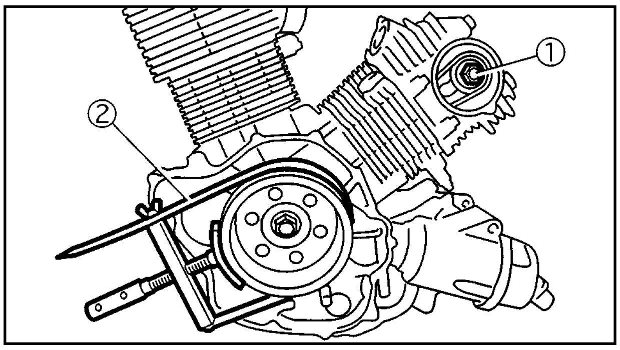
⚠ WARNING

Always use a new gasket.

NOTE:

The "UP" mark on the timing chain tensioner should face up.

	Timing chain tensioner bolt **10 Nm (1.0 m•kg)**



d. Remove the screwdriver, make sure that the timing chain tensioner rod releases, and tighten the cap bolt to the specified torque.

	Cap bolt **8 Nm (0.8 m•kg)**

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5. Install:
   - bolt (camshaft sprocket) ①

   55 Nm (5.5 m•kg)

NOTE:
- Be sure the projection on the camshaft sprocket plate is aligned with the hole in the sprocket.
- Use the sheave holder ② to hold the rotor.

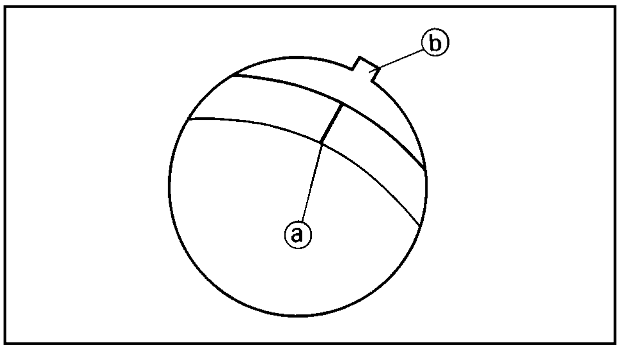
	Sheave holder: **90890-01701**

6. Check:
   - alignment marks
     If the marks do not align → Adjust.
7. Measure:
   - valve clearance
     Out of specification → Adjust.
     Refer to "ADJUSTING THE VALVE CLEARANCE" in Chapter 3.

Front cylinder head

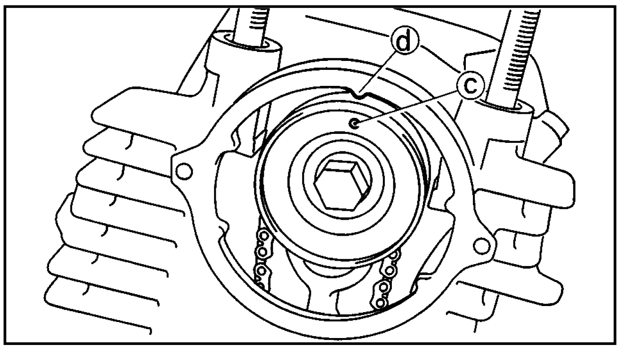
NOTE:
When installing the front cylinder head, repeat the rear cylinder head installation procedure. However, note the following points.

1. Install:
   - camshaft sprocket



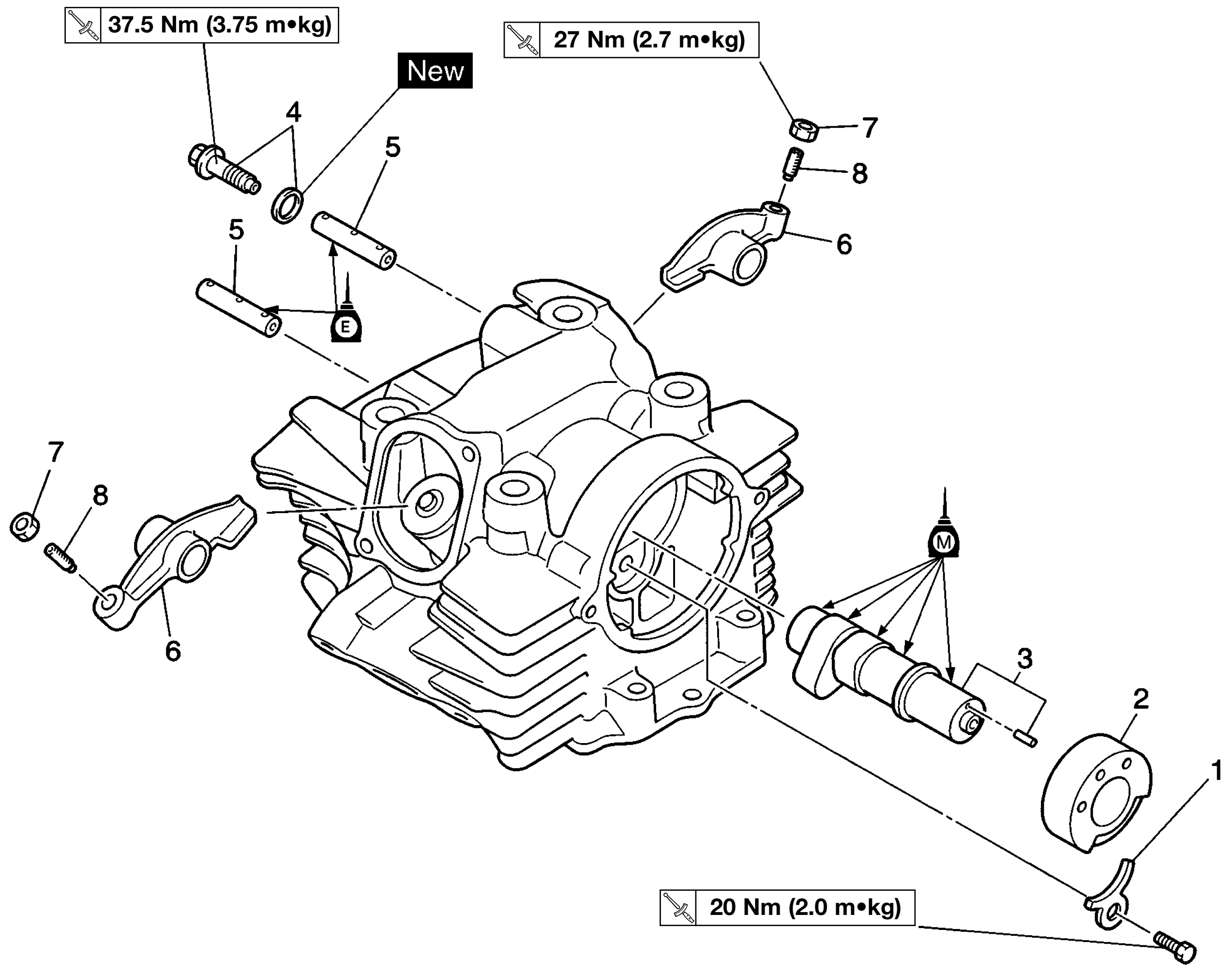
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a. Turn the crankshaft clockwise 290°.
b. Align the "I" mark ⓐ with the stationary pointer ⓑ on the crankcase cover (left).
c. Install the camshaft sprocket with the timing mark ⓒ facing out.
d. Turn the camshaft just enough to remove any slack from the intake side of the timing chain.
e. Insert your finger into the hole and timing chain tensioner hole and push the timing chain guide inward.
f. While pushing the timing chain guide, be sure that the timing mark ⓒ and the stationary pointer ⓓ are properly aligned at TDC.

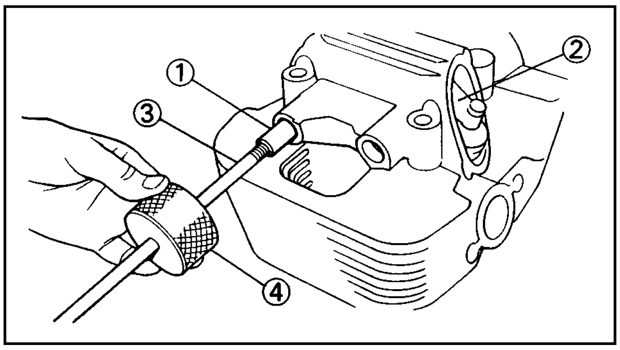


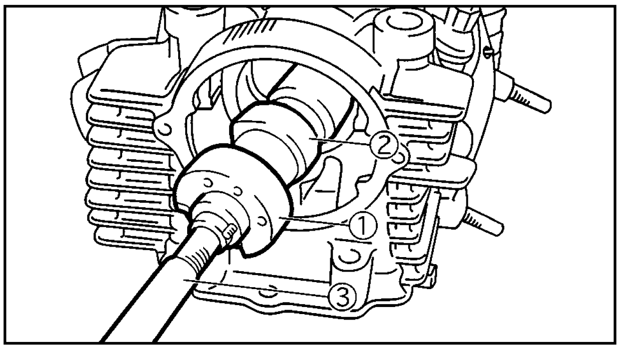
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ROCKER ARMS AND CAMSHAFT



Order	Job name/Part name	Q'ty	Remarks
	Removing the rocker arm and camshaft		Remove the parts in the order listed.
	Cylinder heads		Refer to "CYLINDER HEAD".
1	Stopper plate	1	
2	Camshaft bushing	1	Refer to "REMOVING/INSTALLING THE ROCKER ARM AND CAMSHAFT".
3	Camshaft/dowel pin	1/1	
4	Union bolt/gasket	1/1	
5	Rocker arm shafts	2	Refer to "REMOVING/INSTALLING THE ROCKER ARM AND CAMSHAFT".
6	Rocker arms	2	
7	Locknuts	2	
8	Valve adjusters	2	For installation, reverse the removal procedure.





EAS00202

REMOVING THE ROCKER ARMS AND CAMSHAFT

1. Remove:
   - rocker arm shafts (intake and exhaust) ①
   - rocker arms ②

NOTE:

Use a slide hammer ③ and weight ④ to remove the rocker arm shafts.

Slide hammer bolt (M8):
90890-01085
Weight:
90890-01084

2. Remove:
   - camshaft bushing ①
   - camshaft ②

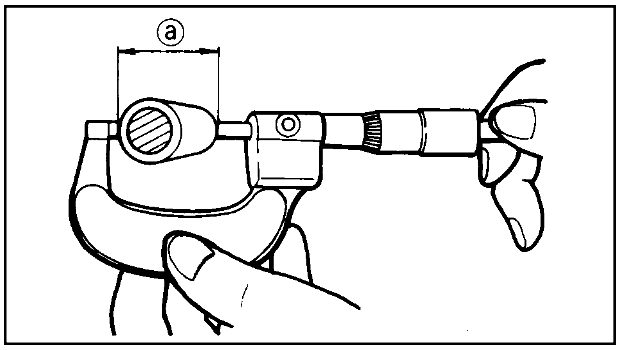
NOTE:

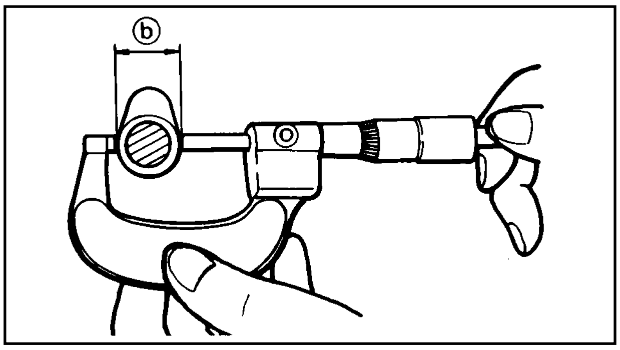
Screw a 10 mm bolt ③ into the threaded end of the camshaft and pull out the camshaft.

EAS00205

CHECKING THE CAMSHAFTS

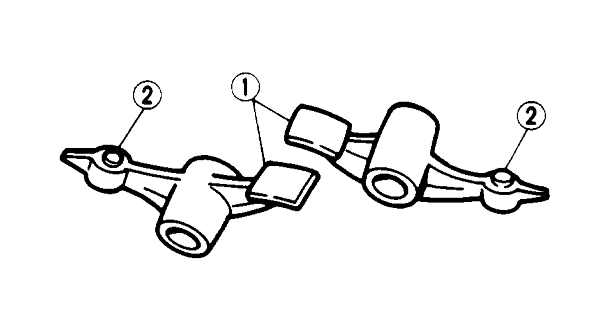
1. Check:
   - camshaft bushings
     Damage/wear → Replace.
2. Check:
   - camshaft lobes
     Blue discoloration/pitting/scratches → Replace the camshaft.
3. Measure:
   - camshaft lobe dimensions ⓐ and ⓑ
     Out of specification → Replace the camshaft.

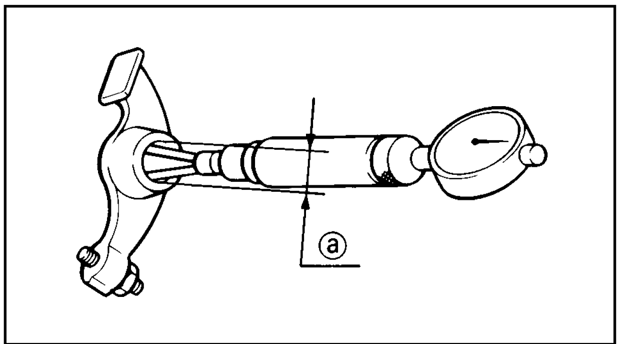


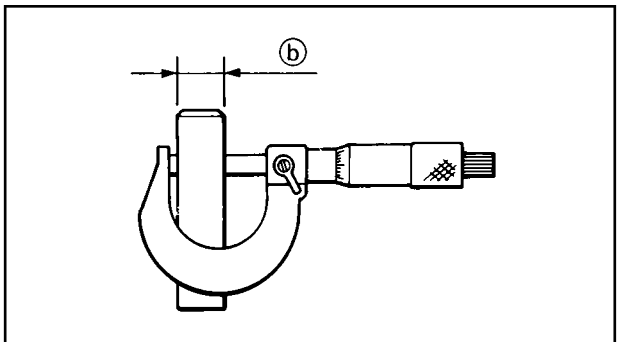


Camshaft lobe dimension limit
Intake
ⓐ 39.012 mm
ⓑ #1: 31.993 mm
#2: 32.027 mm
Exhaust
ⓐ 39.045 mm
ⓑ 32.100 mm

4. Check:
   - camshaft oil passage
     Obstruction → Blow out with compressed air.







EB401410

CHECKING THE ROCKER ARMS AND ROCKER ARM SHAFTS

The following procedure applies to all of the rocker arms and rocker arm shafts.

1. Check:
   - rocker arm
     Damage/wear → Replace.
   - rocker arm lobe ①
   - valve adjuster ②
     Excessive wear → Replace.
2. Check:
   - rocker arm shaft
     Blue discoloration/excessive wear/pitting/scratches → Replace or check the lubrication system.
3. Measure:
   - rocker arm inside diameter ⓐ
     Out of specification → Replace.

	Rocker arm inside diameter **14.036 mm**

4. Measure:
   - rocker arm shaft outside diameter ⓑ
     Out of specification → Replace.

	Rocker arm shaft outside diameter **13.95 mm**

5. Calculate:
   - rocker-arm-to-rocker-arm-shaft clearance

NOTE:

Calculate the clearance by subtracting the rocker arm shaft outside diameter from the rocker arm inside diameter.

Above 0.086 mm → Replace the defective part(-s).

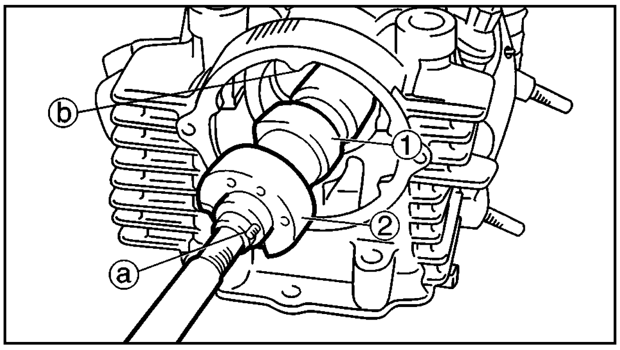
	Rocker-arm-to-rocker-arm-shaft clearance **0.009 ~ 0.033 mm** **<Limit> : 0.086 mm**

EAS00220

INSTALLING THE CAMSHAFT AND ROCKER ARMS

1. Lubricate:
   - camshaft

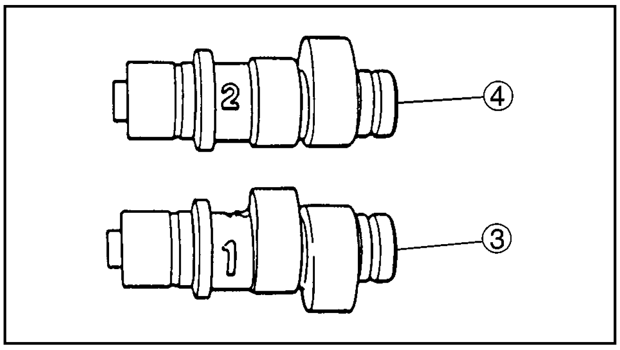
	Recommended lubricant **Camshaft/Bushing** **Molybdenum disulfide oil**

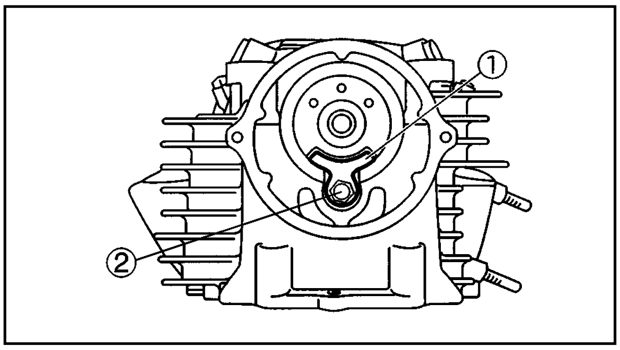


2. Install:
   - camshaft ①
   - camshaft bushing ②

NOTE:

- The dowel pin ⓐ on the end of the camshaft must align with the timing mark ⓑ on the cylinder head.
- Make sure that the N°.1 camshaft ③ is installed in the rear cylinder head and the N°.2 camshaft ④ is installed in the front cylinder head.





3. Install:
   - stopper plate ①

	Stopper plate bolt ② **20 Nm (2.0 m•kg)**

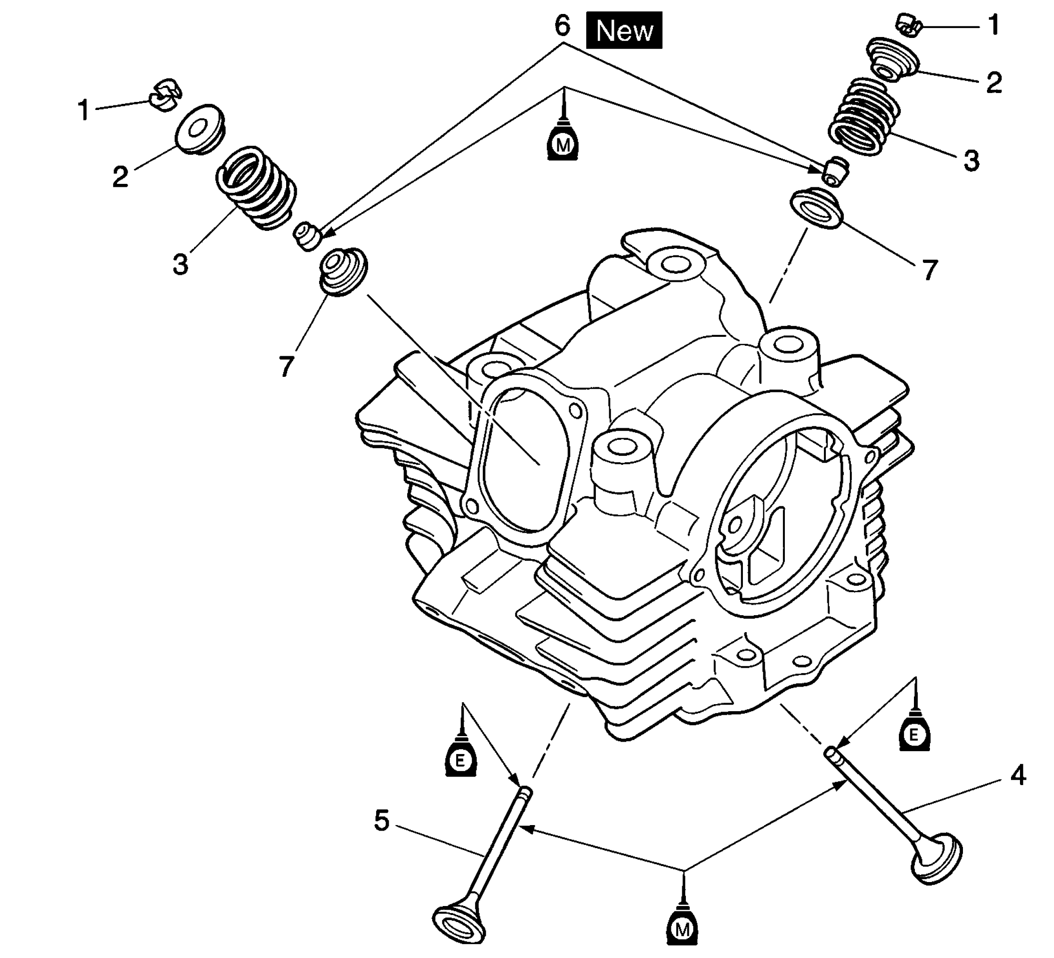
4. Lubricate:
   - rocker arm shafts

	Recommended lubricant **Engine oil**

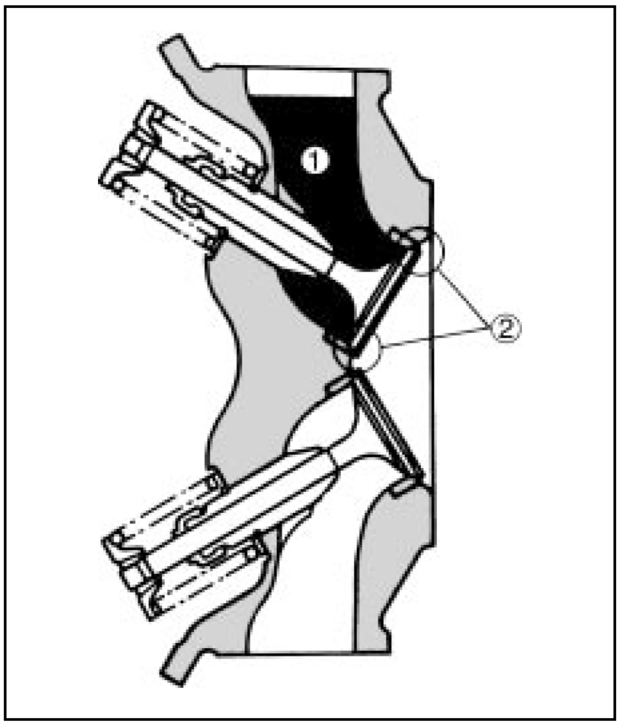
5. Install:
   - rocker arms
   - rocker arm shafts

NOTE:
Make sure that the rocker arm shafts is completely pushed into the cylinder head.

VALVES AND VALVE SPRINGS



Order	Job name/Part name	Q'ty	Remarks
	Removing the valves and valve springs		Remove the parts in the order listed.
	Cylinder heads		Refer to "CYLINDER HEADS".
	Rocker arms and camshafts		Refer to "ROCKER ARMS AND CAM-SHAFT".
1	Valve cotters	4	Refer to "REMOVING/INSTALLING THE VALVES".
2	Valve spring retainers	2	Refer to "INSTALLING THE VALVES".
3	Valve springs	2	
4	Valve (intake)	1	
5	Valve (exhaust)	1	
6	Valve stem seals	2	
7	Valve spring seats	2	
			For installation, reverse the removal procedure.



EAS00237

REMOVING THE VALVES

The following procedure applies to all of the valves and related components.

NOTE:

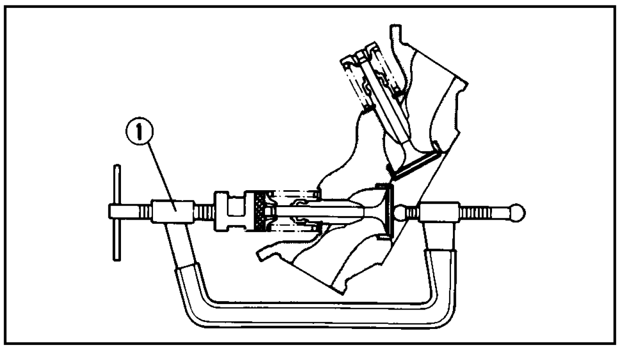
Before removing the internal parts of the cylinder head (e.g., valves, valve springs, valve seats), make sure that the valves properly seal.

1. Check:
   - valve sealing
     Leakage at the valve seat → Check the valve face, valve seat, and valve seat width.
     Refer to "CHECKING THE VALVE SEATS".

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a. Pour a clean solvent ① into the intake and exhaust ports.
b. Check that the valves properly seal. There should be no leakage at the valve seat ②.

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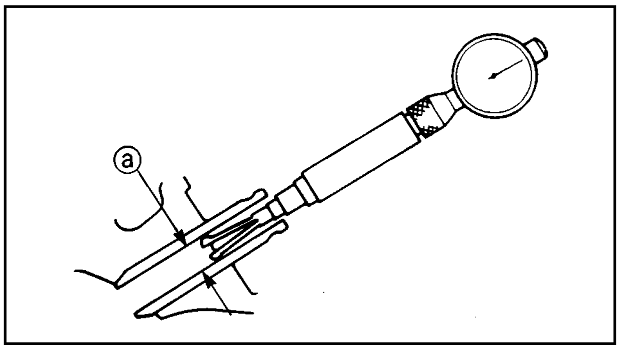


2. Remove:
   - valve cotters

NOTE:

Remove the valve cotters by compressing the valve spring with the valve spring compressor ①.

Valve spring compressor
90890-04019



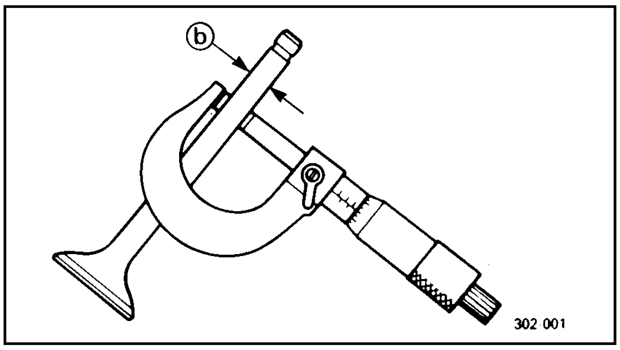
EAS00239

CHECKING THE VALVES AND VALVE GUIDES

The following procedure applies to all of the valve and valve guides.

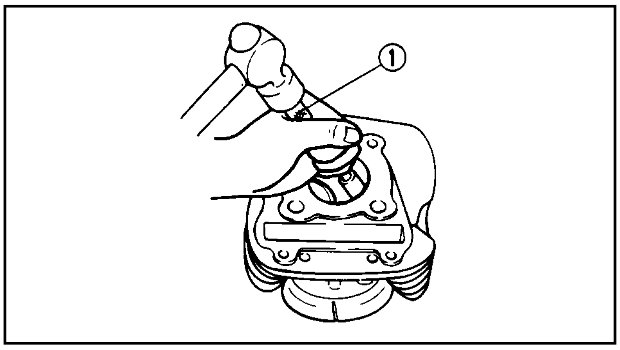
1. Measure:
   - valve-stem-to-valve-guide clearance

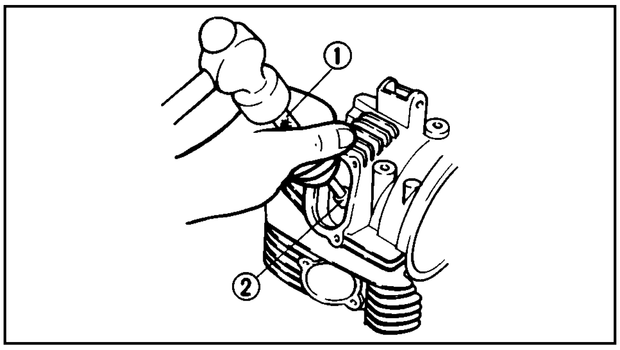
Valve-stem-to-valve-guide clearance =
Valve guide inside diameter ⓐ –
Valve stem diameter ⓑ

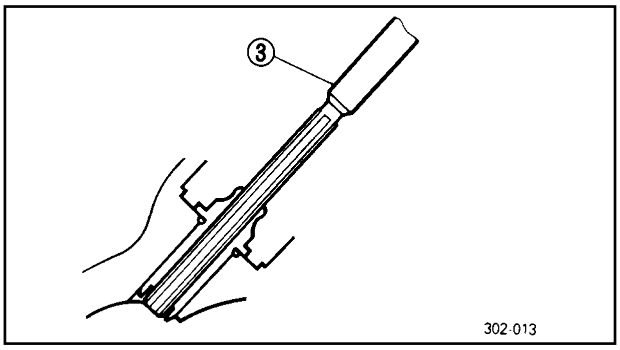


Out of specification → Replace the valve guide.

Valve-stem-to-valve-guide clearance
Intake 0.010 ~ 0.037 mm
<Limit>: 0.08 mm
Exhaust 0.025 ~ 0.052 mm
<Limit>: 0.10 mm







2. Replace:
   - valve guide

NOTE:
To ease valve guide removal and installation, and to maintain the correct fit, heat the cylinder head to 100 °C (212 °K) in an oven.

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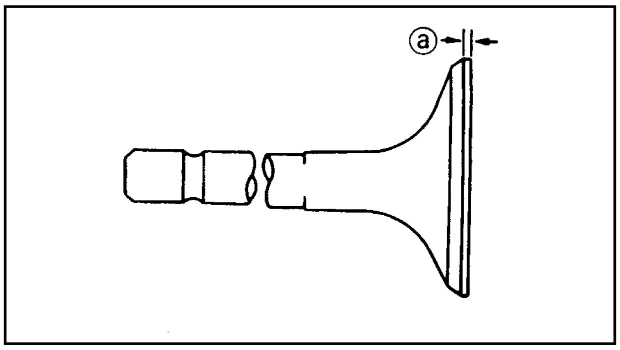
a. Remove the valve guide with a valve guide remover ①.
b. Install the new valve guide with a valve guide installer ② and valve guide remover ①.
c. After installing the valve guide, bore the valve guide with a valve guide reamer ③ to obtain the proper valve-stem-to-valve-guide clearance.

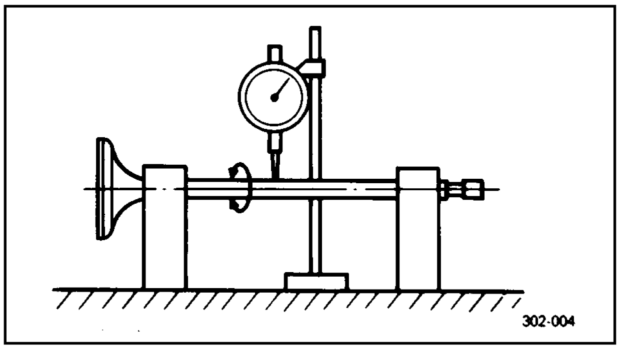
NOTE:
After replacing the valve guide, reface the valve seat.

Valve guide remover and installer (8 mm)
90890-04014

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3. Eliminate:
   - carbon deposits
     (from the valve face and valve seat)
4. Check:
   - valve face
     Pitting/wear → Grind the valve face.
   - valve stem end
     Mushroom shape or diameter larger than the body of the valve stem → Replace the valve.





5. Measure:
   - valve margin thickness ⓐ
     Out of specification → Replace the valve.

Valve margin thickness limit
0.8 mm

6. Measure:
   - valve stem runout
     Out of specification → Replace the valve.

NOTE:
- When installing a new valve, always replace the valve guide.
- If the valve is removed or replaced, always replace the valve stem seal.

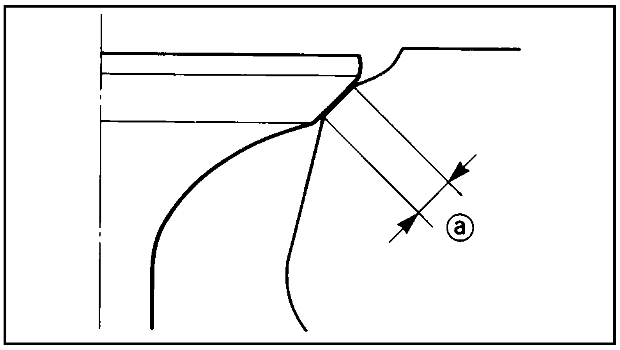
Valve stem runout
0.03 mm

EAS00240

CHECKING THE VALVE SEATS

The following procedure applies to all of the valves and valve seats.

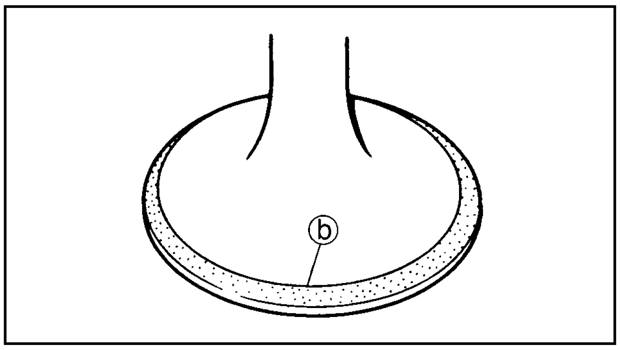
1. Eliminate:
   - carbon deposits
     (from the valve face and valve seat)
2. Check:
   - valve seat
     Pitting/wear → Replace the cylinder head.
3. Measure:
   - valve seat width ⓐ
     Out of specification → Replace the cylinder head.



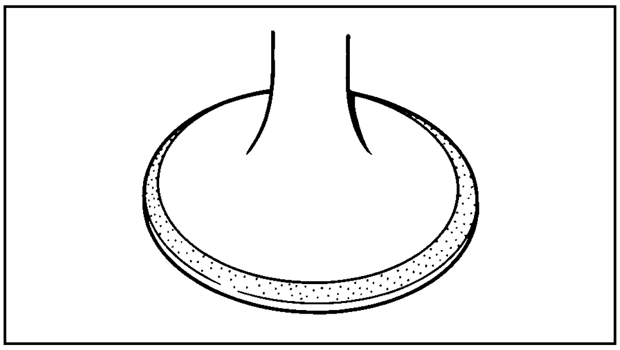
Valve seat width limit
Intake: 1.8 mm
Exhaust: 1.8 mm

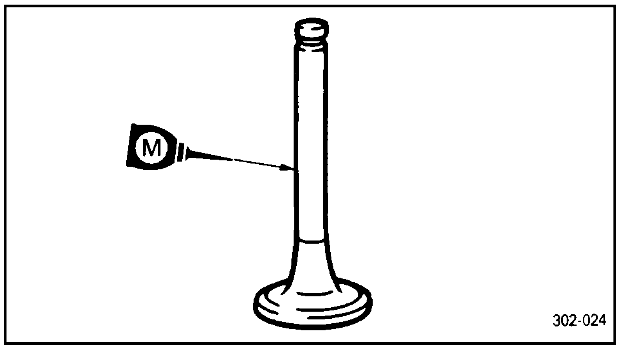
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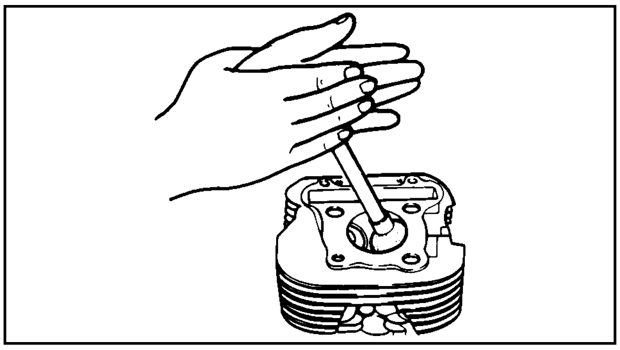
a. Apply Mechanic's blueing dye (Dykem) ⓑ onto the valve face.
b. Install the valve into the cylinder head.
c. Press the valve through the valve guide and onto the valve seat to make a clear pattern.
d. Measure the valve seat width. Where the valve seat and valve face contacted one another, the blueing will have been removed.



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4. Lap:
   • valve face
   • valve seat

NOTE:
After replacing the cylinder head or replacing the valve and valve guide, the valve seat and valve face should be lapped.

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a. Apply a coarse lapping compound to the valve face.

CAUTION:

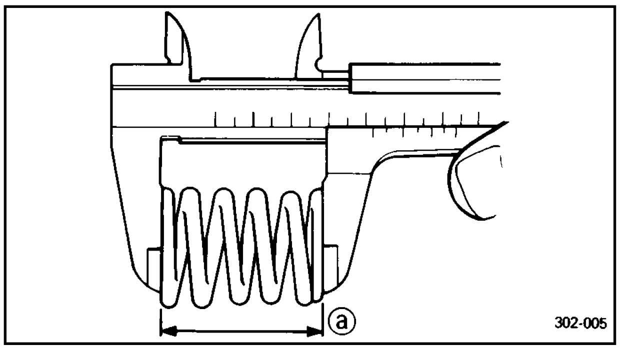
Do not let the lapping compound enter the gap between the valve stem and the valve guide.

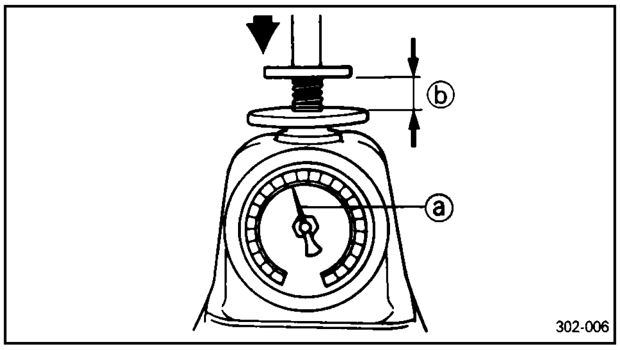
b. Apply molybdenum disulfide oil onto the valve stem.
c. Install the valve into the cylinder head.
d. Turn the valve until the valve face and valve seat are evenly polished, then clean off all of the lapping compound.

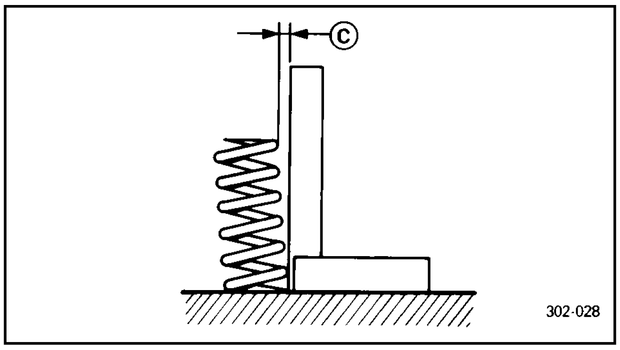
NOTE:
For the best lapping results, lightly tap the valve seat while rotating the valve back and forth between your hand.

e. Apply a fine lapping compound to the valve face and repeat the above steps.
f. After every lapping procedure, be sure to clean off all of the lapping compound from the valve face and valve seat.
g. Apply Mechanic's blueing dye (Dykem) onto the valve face.
h. Install the valve into the cylinder head.
i. Press the valve through the valve guide and onto the valve seat to make a clear impression.
j. Measure the valve seat width again. If the valve seat width is out of specification, reface and lap the valve seat.

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EAS00241

CHECKING THE VALVE SPRINGS

The following procedure applies to all of the valve springs.

1. Measure:
   - valve spring free length ⓐ

     Out of specification → Replace the valve spring.

	Valve spring free length (intake and exhaust) **44.6 mm** **<Limit>: 43.5 mm**

2. Measure:
   - compressed spring force ⓐ

     Out of specification → Replace the valve spring.

ⓑ Installed length

	Compressed spring force **Intake and exhaust spring** **160.7 N (16.4 kg) at 40 mm**

3. Measure:
   - valve spring tilt ⓒ

     Out of specification → Replace the valve spring.

	Spring tilt limit **Intake and exhaust valve spring** **2.5° / 1.9 mm**

EAS00245

INSTALLING THE VALVES

The following procedure applies to all of the valves and related components.

1. Deburr:
   - valve stem end

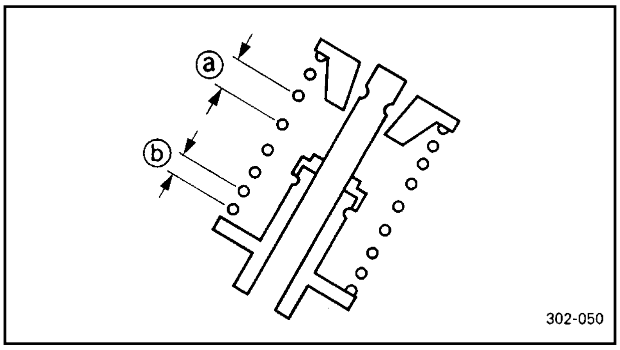
     (with an oil stone)
2. Lubricate:
   - valve stem
   - oil seal New

     (with the recommended lubricant)

	Recommended lubricant **Molybdenum disulfide oil**

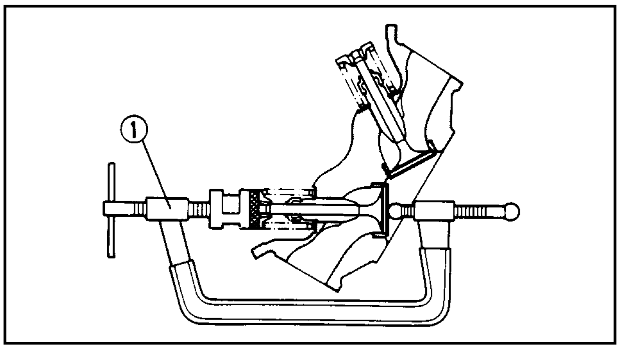
3. Install:
   - valve
   - lower spring seat
   - oil seal New
   - valve spring
   - upper spring seat

     (into the cylinder head)



NOTE:
Install the valve spring with the larger pitch ⓐ facing up.

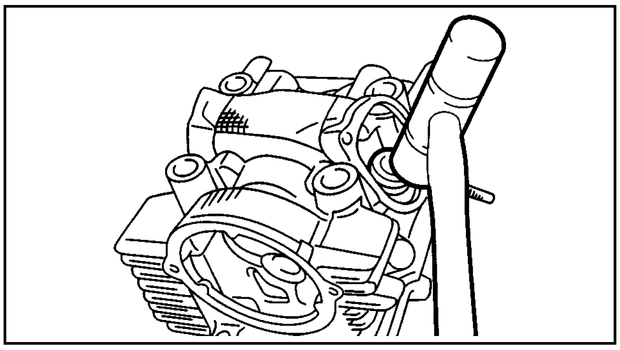
ⓑ Smaller pitch



4. Install:
   • valve cotters

NOTE:
Install the valve cotters by compressing the valve spring with the valve spring compressor ①.

	Valve spring compressor 90890-04019

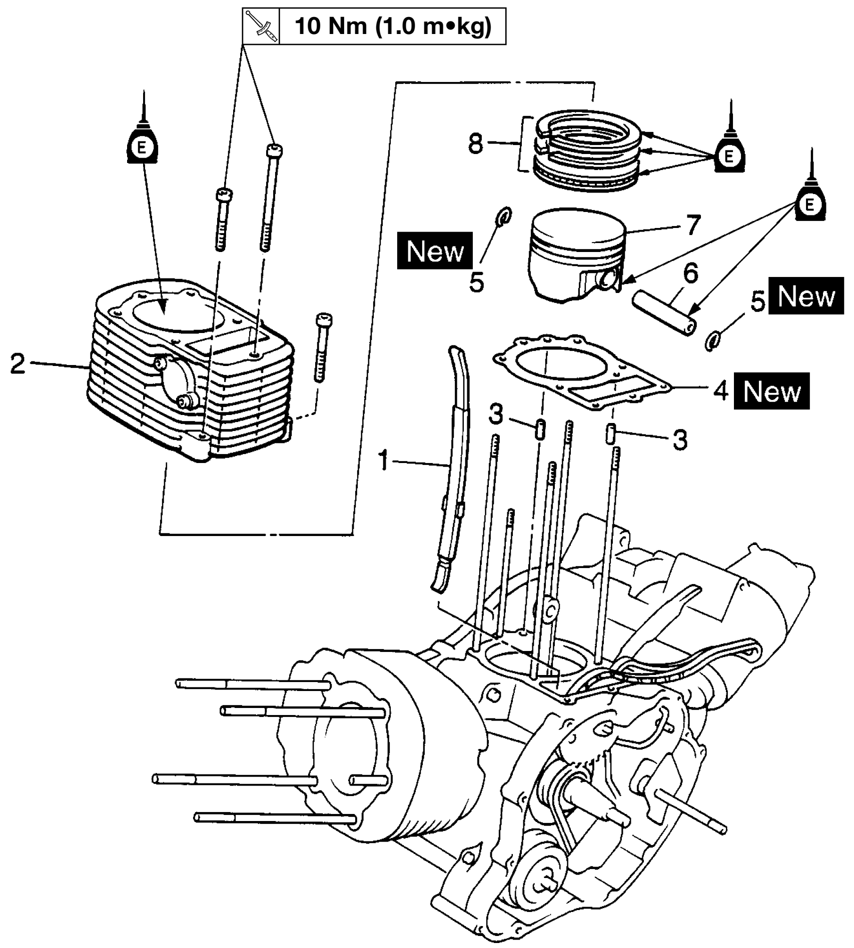


5. To secure the valve cotters onto the valve stem, lightly tap the valve tip with a soft-face hammer.

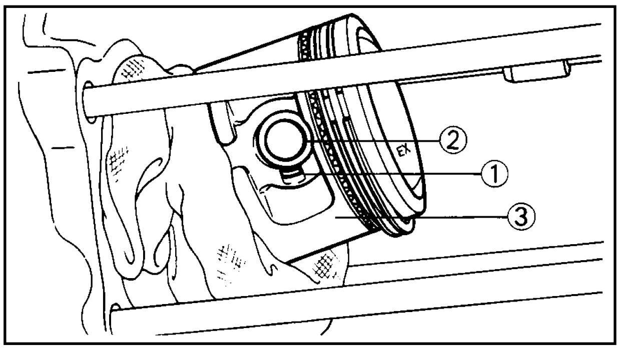
CAUTION:

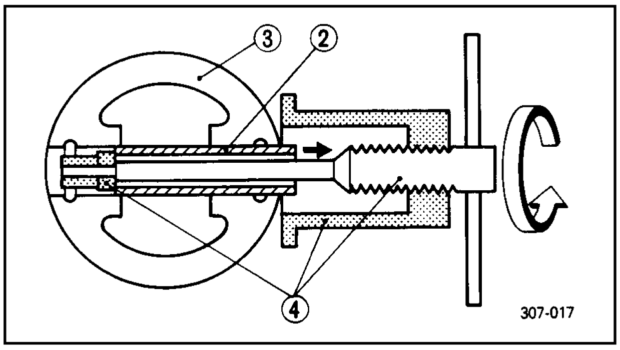
Hitting the valve tip with excessive force could damage the valve.

CYLINDERS AND PISTONS



Order	Job name/Part name	Q'ty	Remarks
	Removing the cylinders and pistons		Remove the parts in the order listed.
	Cylinder heads		Refer to "CYLINDER HEADS".
1	Timing chain guide	1	The "5EL" mark should face towards the cylinder head.
2	Cylinder	1	Refer to "INSTALLING THE PISTONS AND CYLINDERS".
3	Dowel pins	2	
4	Cylinder gasket	1	
5	Piston pin clips	2	Refer to "REMOVING/INSTALLING THE CYLINDERS AND PISTONS".
6	Piston pin	1	
7	Piston	1	
8	Piston ring set	1	
			For installation, reverse the removal procedure.





EAS00254

REMOVING THE PISTONS

The following procedure applies to all of the pistons.

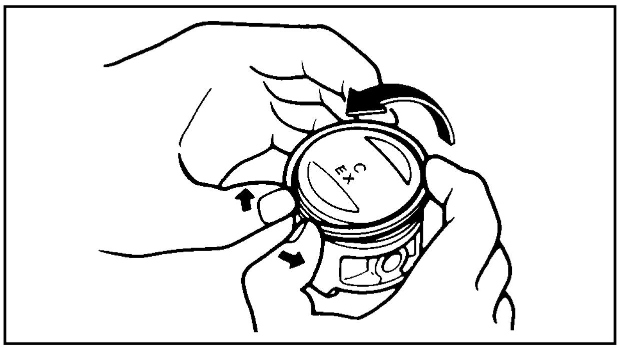
1. Remove:
   - piston pin clip ①
   - piston pin ②
   - piston ③

CAUTION:

Do not use a hammer to drive the piston pin out.

NOTE:
- Before removing the piston pin clip, cover the crankcase opening with a clean rag to prevent the piston pin clip from falling into the crankcase.
- For reference during installation, put an identification mark on each piston crown.
- Before removing the piston pin, deburr the piston pin clip's groove and the piston's pin bore area. If both areas are deburred and the piston pin is still difficult to remove, remove it with the piston pin puller ④.

	Piston pin puller **90890-01304**



2. Remove:
   - top ring
   - 2nd ring
   - oil ring

NOTE:
When removing a piston ring, open the end gap with your fingers and lift the other side of the ring over the piston crown.

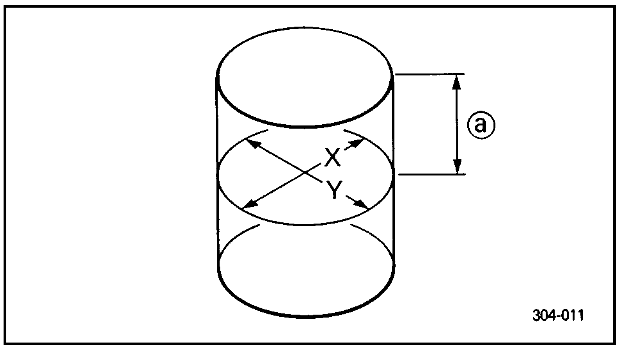
EB404405

CHECKING THE CYLINDERS AND PISTONS

The following procedure applies to all of the cylinders and pistons.

1. Check:
   - piston wall
   - cylinder wall

     Vertical scratches → Rebore or replace the cylinder, and replace the piston and piston rings as a set.



2. Measure:
   - piston-to-cylinder clearance

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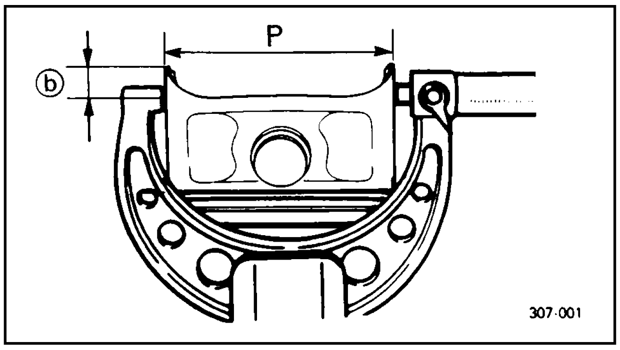
a. Measure cylinder bore "C" with the cylinder bore gauge.

ⓐ 40 mm from the top of the cylinder

NOTE:

Measure cylinder bore "C" by taking side-to-side and front-to-back measurements of the cylinder. Then, find the average of the measurements.

	Standard	Wear limit
Cylinder bore C:	**95.00 ~ 95.01 mm**	**95.1 mm**
$C = \frac{X + Y}{2}$		



b. If out of specification, rebore or replace the cylinder, and replace the piston and piston rings as a set.
c. Measure piston skirt diameter "P" with the micrometer.

ⓑ 5 mm from the bottom edge of the piston.

	Piston size P
Standard	**94.960 ~ 94.975 mm**

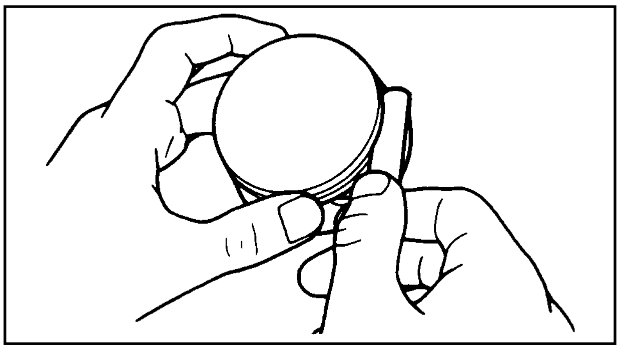
d. If out of specification, replace the piston and piston rings as a set.
e. Calculate the piston-to-cylinder clearance with the following formula.

Piston-to-cylinder clearance =
Cylinder bore "C" –
Piston skirt diameter "P"

Piston-to-cylinder clearance
0.025 ~ 0.050 mm
<Limit>: 0.15 mm

f. If out of specification, replace the cylinder, and replace the piston and piston rings as a set.

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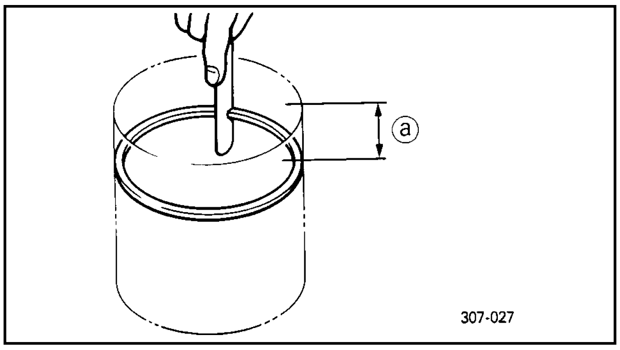
EB404410

CHECKING THE PISTON RINGS

1. Measure:
   - piston ring side clearance
     Out of specification → Replace the piston and piston rings as a set.

NOTE:
Before measuring the piston ring side clearance, eliminate any carbon deposits from the piston ring grooves and piston rings.

Piston ring side clearance
Top ring
0.04 ~ 0.08 mm
<Limit>: 0.1 mm
2nd ring
0.03 ~ 0.07 mm
<Limit>: 0.1 mm



2. Install:
   - piston ring
     (into the cylinder)

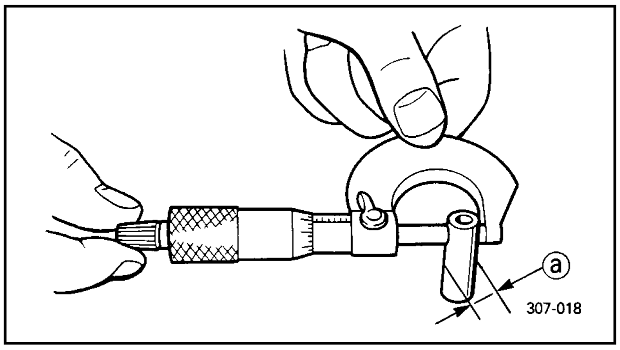
NOTE:
Using the piston crown pash the ring into the cylinder so that the ring will be at a right angle to the cylinder bore.

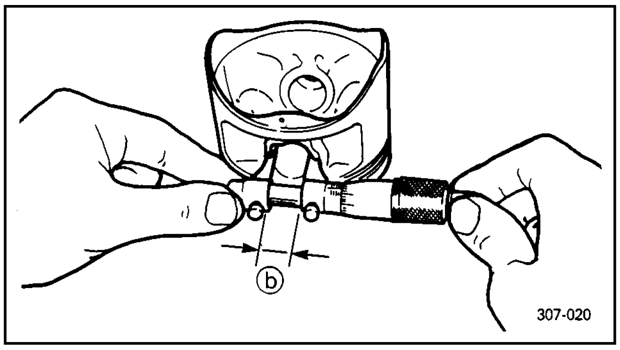
ⓐ 40 mm from the top of the cylinder

3. Measure:
   - piston ring end gap
     Out of specification → Replace the piston ring.

NOTE:
The oil ring expander spacer's end gap cannot be measured. If the oil ring rail's gap is excessive, replace all three piston rings.

Piston ring end gap
Top ring
0.3 ~ 0.5 mm
<Limit>: 0.8 mm
2nd ring
0.3 ~ 0.45 mm
<Limit>: 0.8 mm
Oil ring
0.2 ~ 0.7 mm





EAS00266

CHECKING THE PISTON PINS

The following procedure applies to all of the piston pins.

1. Check:
   - piston pin
     Blue discoloration/grooves → Replace, then inspect the lubrication system.

2. Measure:
   - piston pin outside diameter ⓐ
     Out of specification → Replace the piston pin.

	Piston pin outside diameter **21.991 ~ 22.000 mm**

3. Measure:
   - piston pin bore inside diameter ⓑ
     Out of specification → Replace the piston

	Piston pin bore inside diameter **22.004 ~ 22.015 mm**

4. Calculate:
   - piston-pin-to-piston clearance
     Out of specification → Replace the piston pin.

Piston-pin-to-piston clearance =
Piston pin bore size ⓑ –
Piston pin outside diameter ⓐ

	Piston-pin-to-piston clearance **0.004 ~ 0.024 mm**

EB404701

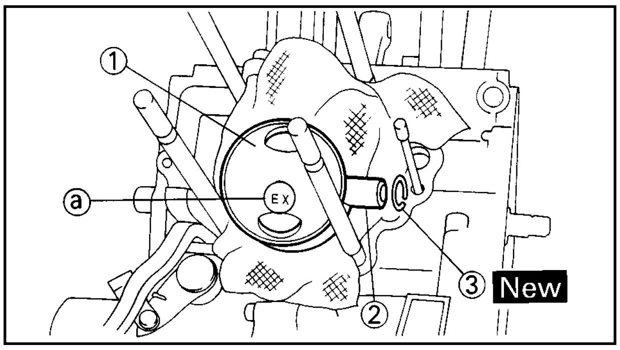
INSTALLING THE PISTONS AND CYLINDERS

The following procedure applies to all of the pistons and cylinders.

1. Install:
   - oil ring expander
   - lower oil ring rail
   - upper oil ring rail
   - 2nd ring
   - top ring

NOTE:

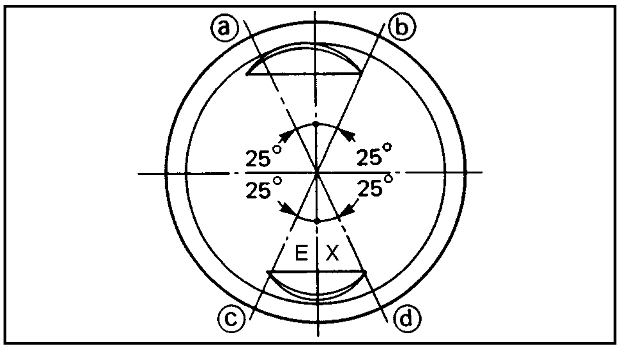
Be sure to install the piston rings so that the manufacuturer’s marks or numbers face up.



2. Install:
   - piston ①
   - piston pin ②
   - piston pin clip (New) ③

NOTE:
- Apply engine oil onto the piston pin.
- Make sure that the "EX" mark ⓐ on the piston faces towards the exhaust side of the engine.
- Before installing the piston pin clip, cover the crankcase opening with a clean rag to prevent the clip from falling into the crankcase.

3. Install:
   - gasket (New)
   - dowel pins
4. Lubricate:
   - piston
   - piston rings
   - cylinder
   (with the recommended lubricant)

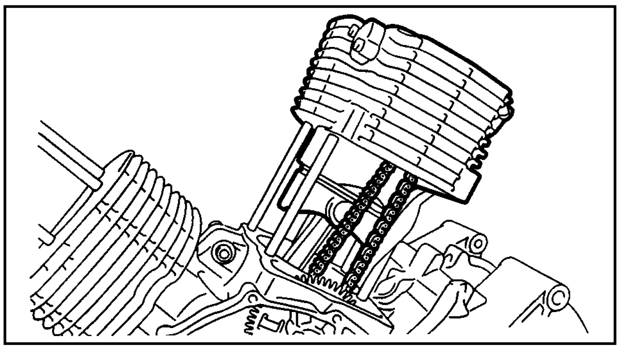


	Recommended lubricant **Engine oil**

5. Offset:
   - piston ring end gaps

ⓐ Top ring
ⓑ Lower oil ring rail
ⓒ Upper oil ring rail
ⓓ 2nd ring

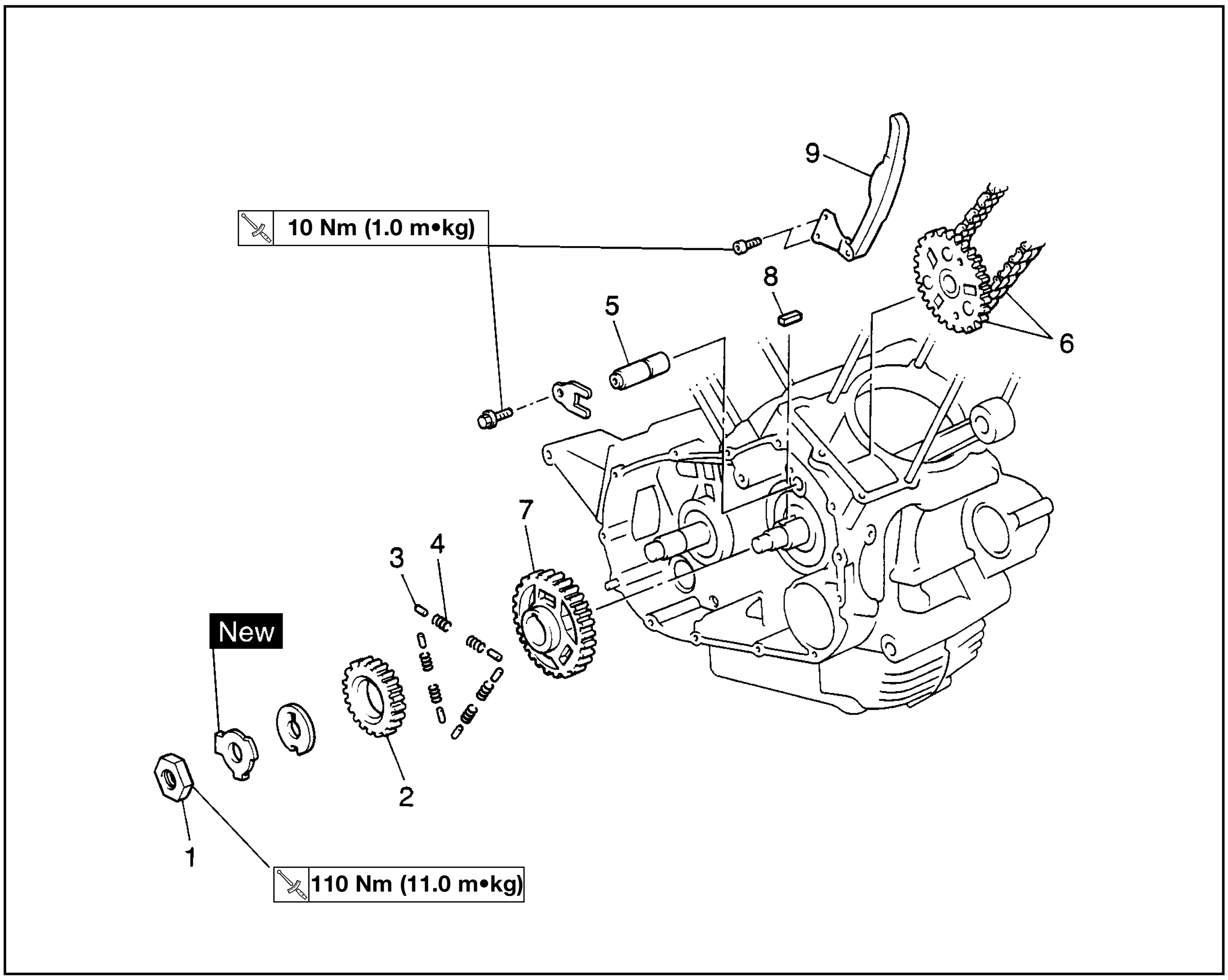
6. Install:
   - cylinder



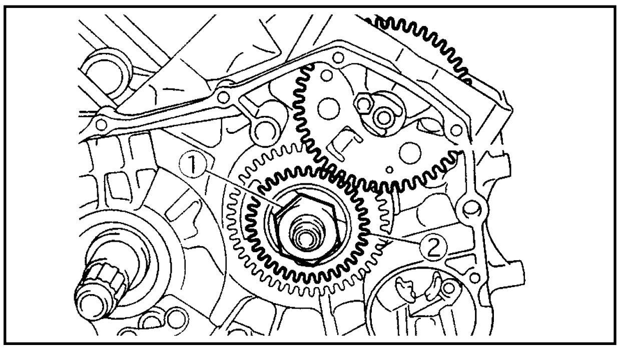
NOTE:
- While compressing the piston rings with one hand, install the cylinder with the other hand.
- Pass the timing chain and timing chain guide (exhaust side) through the timing chain cavity.

	Cylinder bolt **10 Nm (1.0 m•kg)**

TIMING GEARS



Order	Job name/Part name	Q'ty	Remarks
	Removing the timing gears		Remove the parts in the order listed.
	Cylinder heads		Refer to "CYLINDER HEAD".
	Cylinders		Refer to "CYLINDERS AND PISTONS".
	Clutch assembly		Refer to "CLUTCH".
1	Primary drive gear nut	1	Refer to "REMOVING/INSTALLING THE TIMING DRIVE GEARS".
2	Timing drive gear	1	
3	Dowel pins	6	
4	Springs	6	
5	Timing chain drive gear shaft	1	Refer to "INSTALLING THE TIMING DRIVE GEARS".
6	Timing chain drive gear sprocket/ Timing chain	1/1	
7	Primary drive gear	1	
8	Straight key	1	
9	Timing chain guide	1	
			For installation, reverse the removal procedure.



REMOVING THE TIMING DRIVE GEAR

Front cylinder

1. Straighten the lock washer tab.
2. Remove:
   - primary drive gear nut ①

NOTE:
While holding the generator rotor with the sheave holder, loosen the primary drive gear nut.

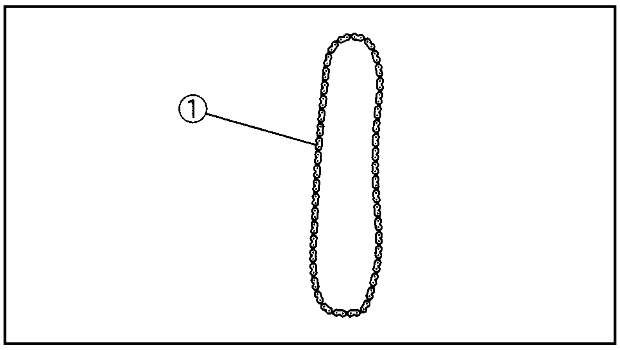
3. Remove:
   - timing drive gear ②
   - dowel pins
   - springs

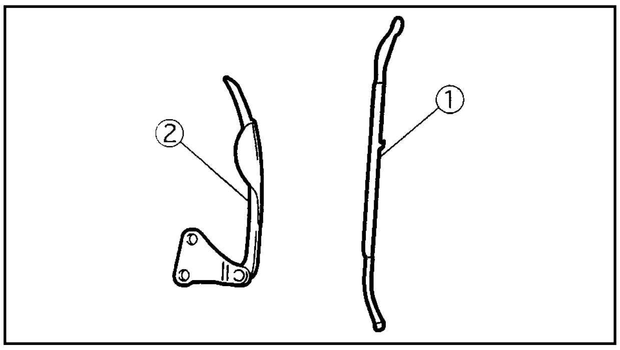
NOTE:
When removing the timing drive gear, the dowel pins and springs are scatter and dropping down. Do not missing them.

Rear cylinder

NOTE:
When removing the rear cylinder timing gear, repeat the front cylinder timing gear removal procedure. However, note the following points.

1. Remove:
   - rotor assembly
   - dowel pins
   - springs
   - timing drive gear
     Refer to "GENERATOR AND STARTER CLUTCH".





EB401422

CHECKING THE TIMING CHAINS, CAMSHAFT SPROCKETS, AND TIMING CHAIN GUIDES

The following procedure applies to all of the timing chains, camshaft sprockets, and timing chain guides.

1. Check:
   - timing chain ①
     Damage/sitffness → Replace the timing chain and its respective camshaft sprockets as a set.
2. Check:
   - camshaft sprocket
     Damage/wear → Replace the respective camshaft sprockets and the respective timing chain as a set.
3. Check:
   - timing chain guide (exhaust side) ①
   - timing chain guide (intake side) ②
     Damage/wear → Replace the defective part(-s).

EAS00292

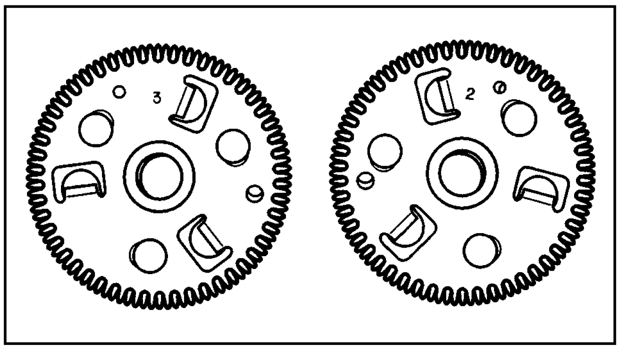
CHECKING THE PRIMARY DRIVE

1. Check:
   - primary drive gear
   - primary driven gear
     Damage/wear → Replace the primary drive and primary driven gears as a set.
     Excessive noise during operation → Replace the primary drive and primary driven gears as a set.
2. Check:
   - primary-drive-gear-to-primary-driven-gear free play
     Free play exists → Replace the primary drive and primary driven gears as a set.

INSTALLING THE TIMING DRIVE GEARS

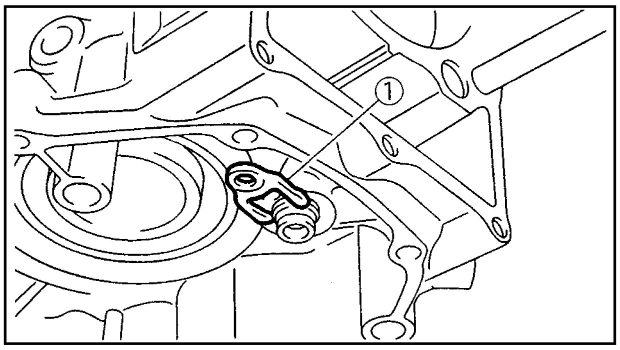
1. Install:
   - timing chain
     (onto the timing chain drive gear sprocket)

NOTE:
To prevent the timing chain from falling into the crankcase, fasten it with a wire.



2. Install:
   - timing chain drive gear sprocket
   - timing chain drive gear shaft

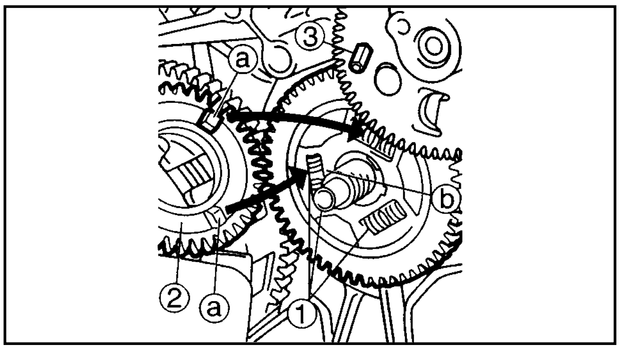
NOTE:
Make sure that the “2” mark on the timing chain drive gear sprocket is installed in the rear cylinder and the “3” mark on the timing chain drive gear sprocket is installed in the front cylinder.

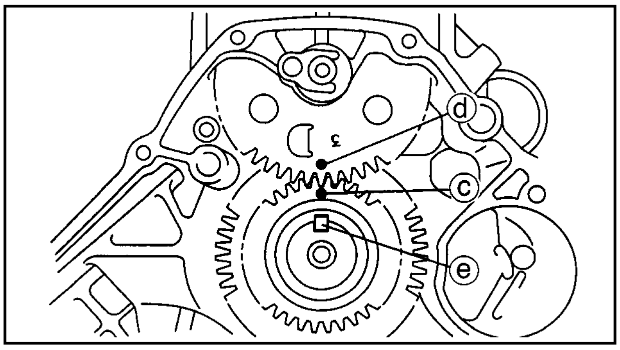


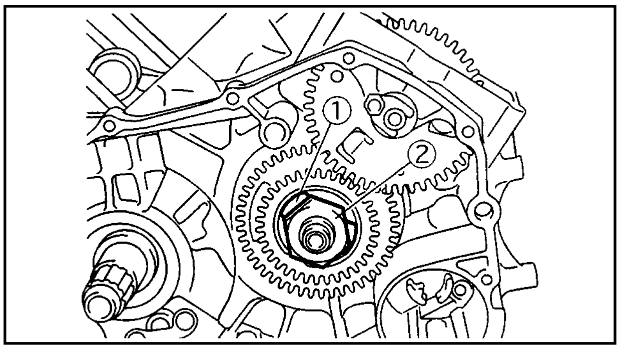
3. Install:
   - stopper plate ①
   - stopper plate bolt

10 Nm (1.0 m•kg)

NOTE:
Turn the timing chain drive gear shaft so that the stopper plate fits correctly into the slot and then fasten the stopper plate with the bolt.







Front cylinder

1. Install:
   (front cylinder)
   - springs ①
   - dowel pins
   - timing drive gear ②

NOTE:
- Insert the suitable pin ③ into the hole of timing chain drive gear sprocket and match the gear teeth.
- Push the projections ⓐ on the timing drive gear into the spaces ⓑ.
- Align the punch mark ⓒ on the timing drive gear, the punch mark ⓓ on the timing chain drive gear sprocket and the key posision ⓔ as shown.

2. Install:
   - claw washer
   - lock washer ① New
   - primary drive gear nut ②

   110 Nm (11.0 m•kg)

NOTE:
While holding the generator retor with the sheave holder, tighten the primary drive gear nut.

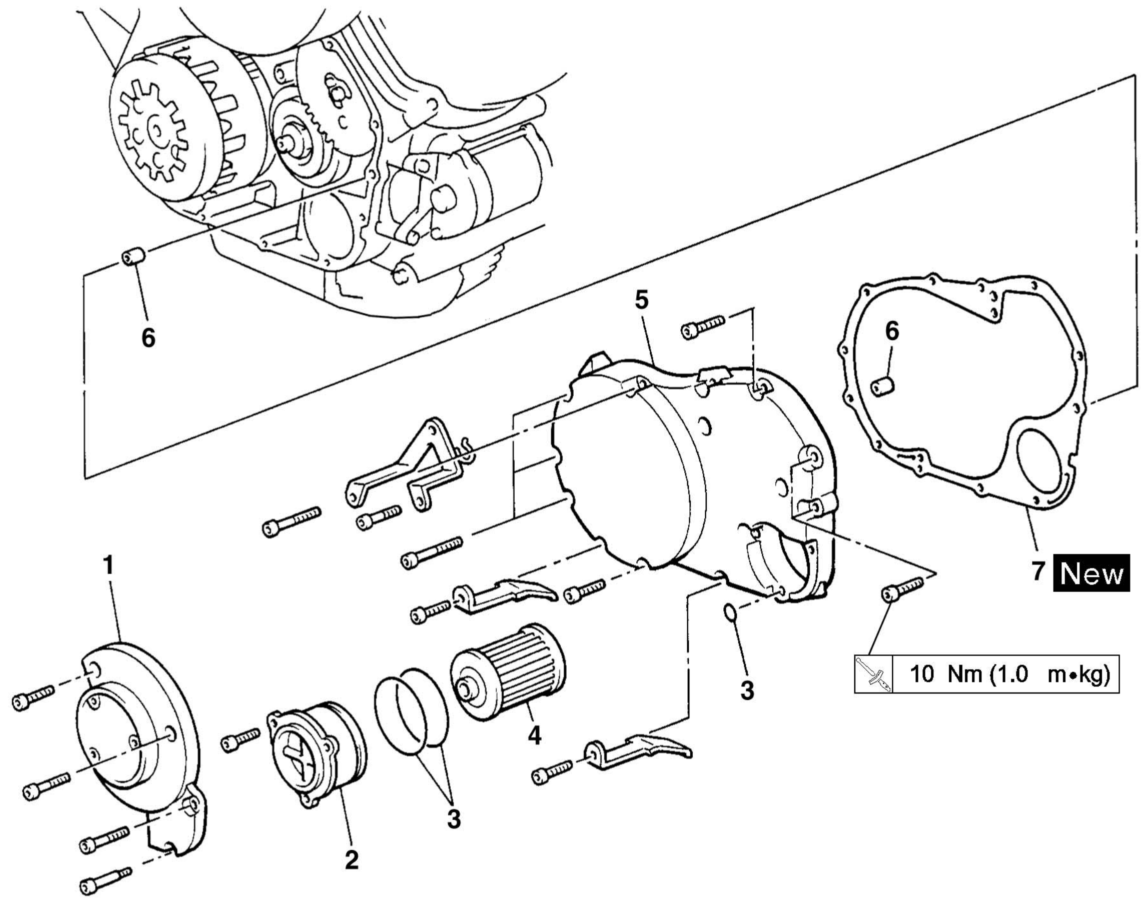
3. Bend the lock washer tab along a flat side of the nut.

Rear cylinder

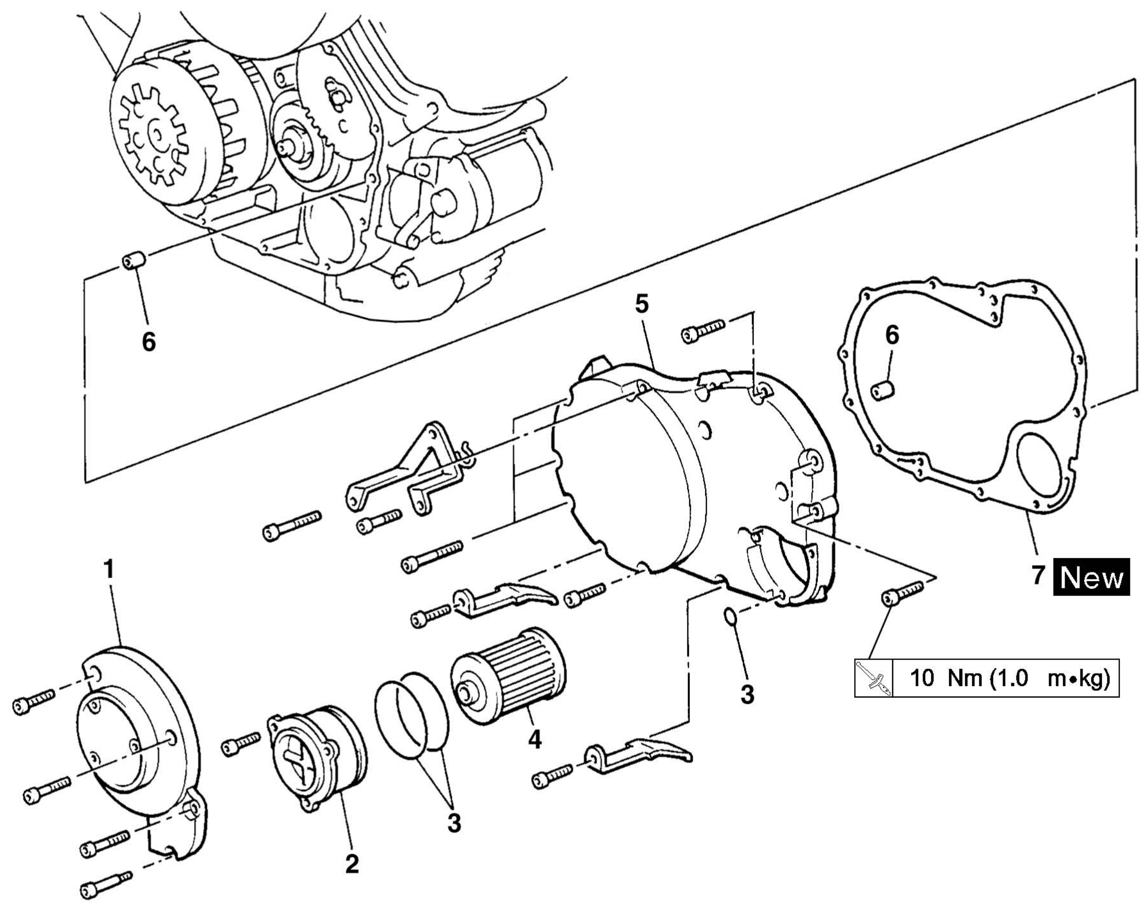
NOTE:
When installing the rear cylinder timing gear, repeat the front cylinder timing gear installation procedure. However, note the following points.

1. Install:
   - springs
   - dowel pins
   - timing drive gear
   - rotor assembly
     Refer to "GENERATOR AND STARTER CLUTCH".

CLUTCH
RIGHT CRANKCASE COVER

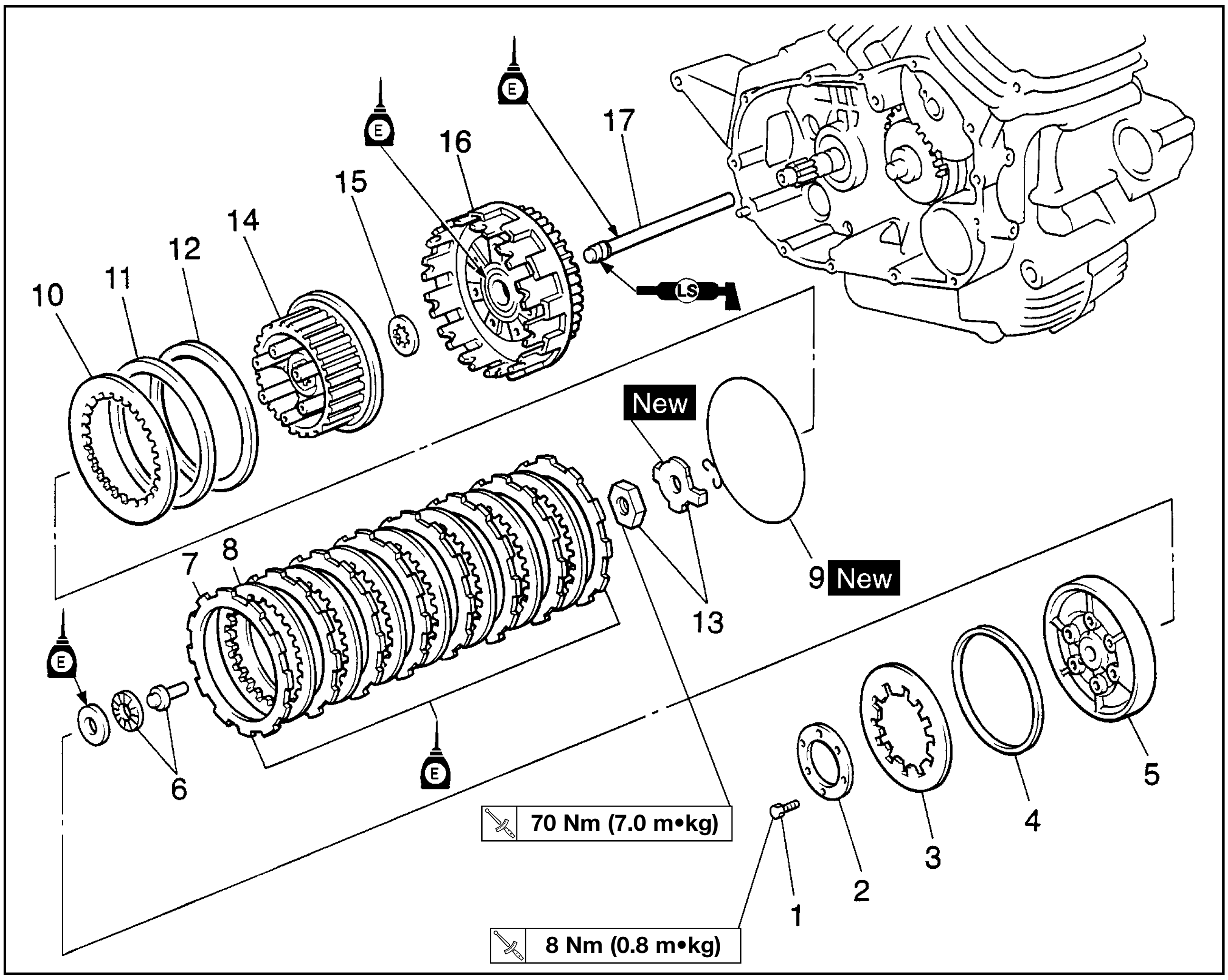


Order	Job name/Part name	Q'ty	Remarks
	Removing the right clutch cover		Remove the parts in the order listed. Stand the motorcycle on a level surface. **WARNING** **Securely support the motorcycle so there is no danger of it falling over.**
	Engine oil		Refer to "ENGINE OIL REPLACEMENT" in Chapter 3.
1	Oil filter cover plate	1	
2	Oil filter cover	1	
3	O-rings	3	
4	Oil filter	1	
5	Right crankcase cover	1	

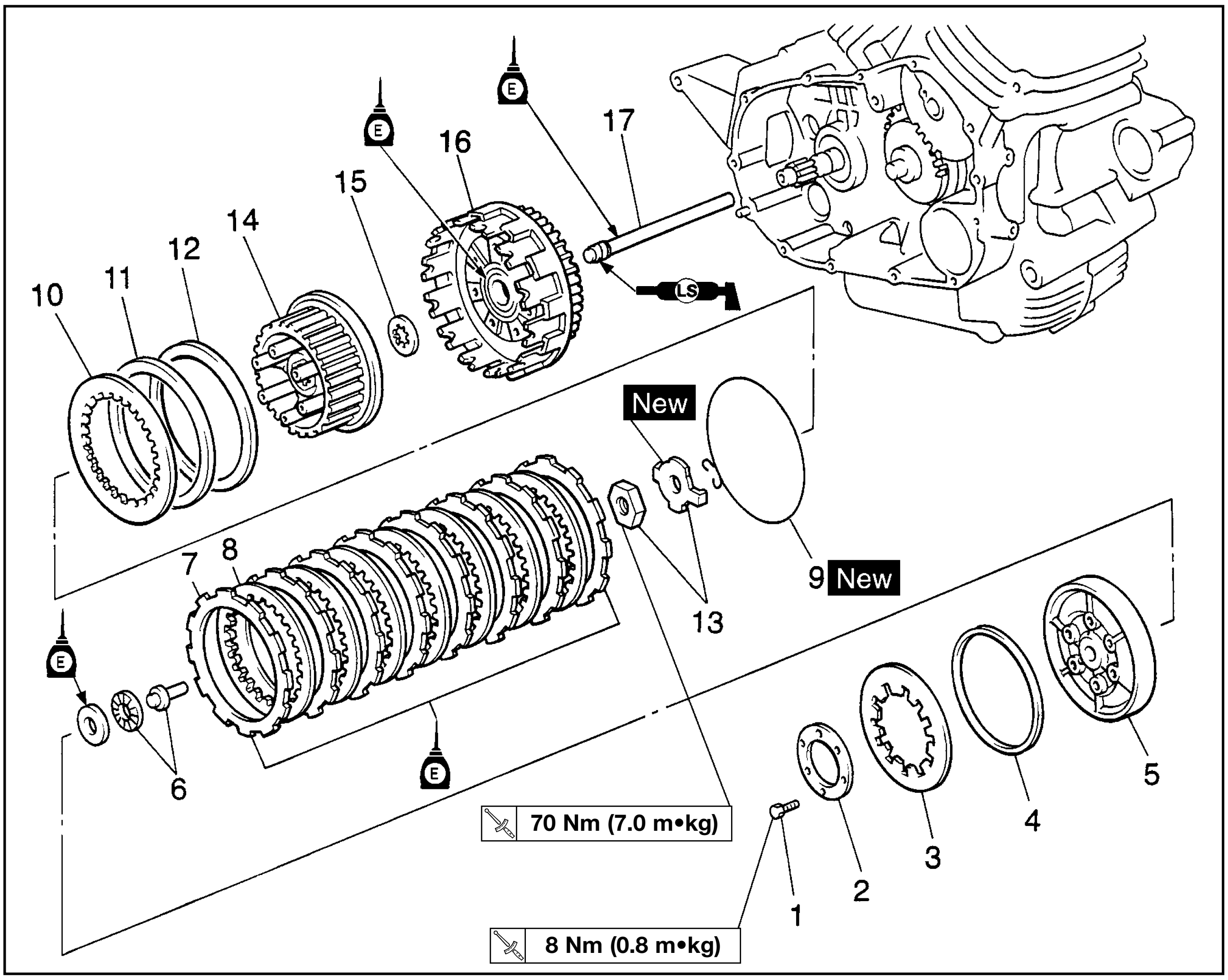


Order	Job name/Part name	Q'ty	Remarks
6	Dowel pins	2	
7	Crankcase cover gasket	1	
			For installation, reverse the removal procedure.

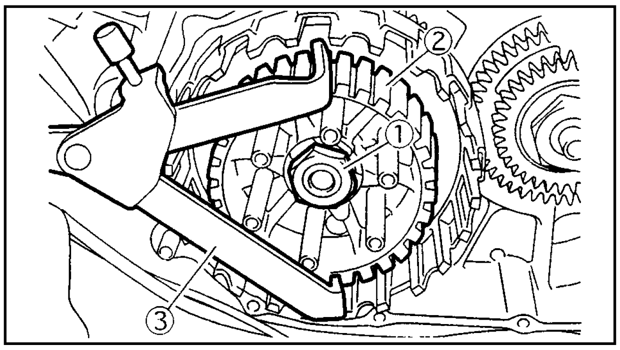
CLUTCH ASSEMBLY

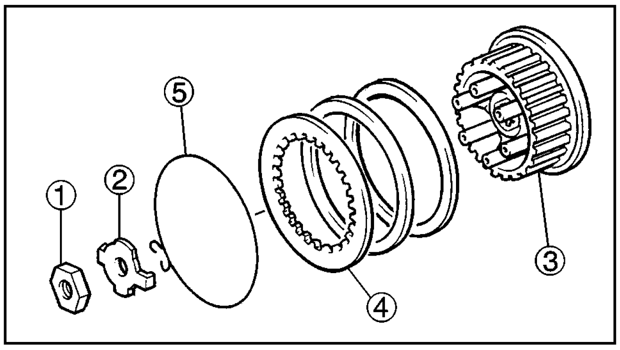


Order	Job name/Part name	Q'ty	Remarks
	Removing the clutch		Remove the parts in the order listed.
1	Clutch spring bolts	6	Refer to "INSTALLING THE CLUTCH".
2	Clutch spring plate	1	
3	Clutch spring	1	
4	Clutch spring seat	1	
5	Clutch pressure plate	1	
6	Bearing/shart clutch push rod	1/1	
7	Friction plates	6	
8	Clutch plates	5	
9	Wire circlip	1	Refer to "REMOVING/INSTALLING THE CLUTCH"
10	Clutch plate	1	
11	Damper	1	
12	Clutch damper plate	1	
13	Nut/lock washer	1/1	
14	Clutch boss	1	



Order	Job name/Part name	Q'ty	Remarks
15	Thrust washer	1	
16	Clutch housing	1	
17	Long clutch push rod	1	
			For installation, reverse the removal procedure.





EAS00278

REMOVING THE CLUTCH

1. Straighten the lock washer tab.
2. Loosen:
   • clutch boss nut ①

NOTE:

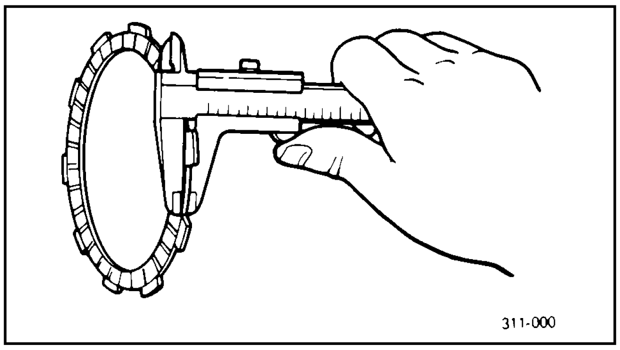
While holding the clutch boss ② with the clutch holding tool ③, loosen the clutch boss nut.

Clutch holding tool
90890-04086

3. Remove:
   • clutch boss nut ①
   • lock washer ②
   • clutch boss ③

NOTE:

There is a built-in damper between the clutch boss ③ and the clutch plate ④. It is not necessary to remove the wire circlip ⑤ and disassemble the built-in damper unless there is serious clutch chattering.



EAS00281

CHECKING THE FRICTION PLATES

The following procedure applies to all of the friction plates.

1. Check:
   • friction plate
   Damage/wear → Replace the friction plates as a set.
2. Measure:
   • friction plate thickness
   Out of specification → Replace the friction plates as a set.

NOTE:

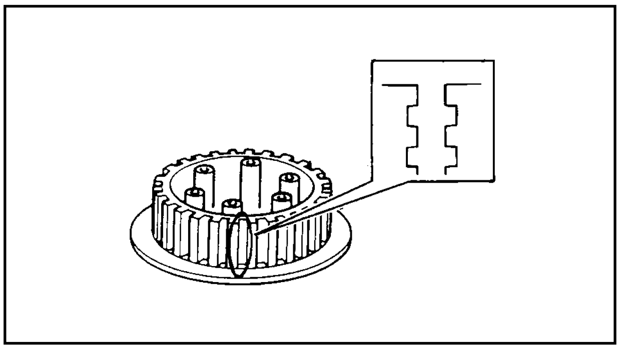
Measure the friction plate at four places.

Friction plate thickness
2.9 ~ 3.1 mm
<Limit>: 2.8 mm

EAS00286

CHECKING THE PRESSURE PLATE

1. Check:
   - pressure plate
     Cracks/damage → Replace.
   - bearing
     Damage/wear → Replace.

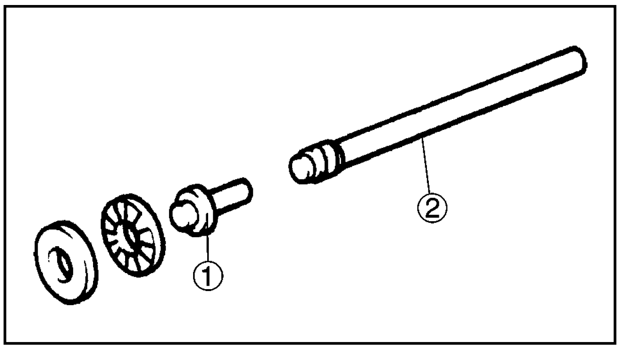


EAS00285

CHECKING THE CLUTCH BOSS

1. Check:
   - clutch boss splines
     Damage/pitting/wear → Replace the clutch boss.

NOTE:
Pitting on the clutch boss splines will cause erratic clutch operation.



EAS00288

CHECKING THE CLUTCH PUSH RODS

1. Check:
   - short clutch push rod ①
   - long clutch push rod ②
     Cracks/damage/wear → Replace the defective part(-s).
2. Measure:
   - long clutch push rod bending limit
     Out of specification → Replace the long clutch push rod.

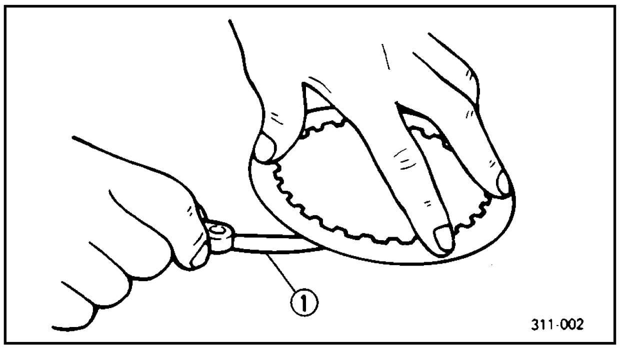
Long clutch push rod bending limit
0.5 mm

EAS00281

CHECKING THE CLUTCH PLATES

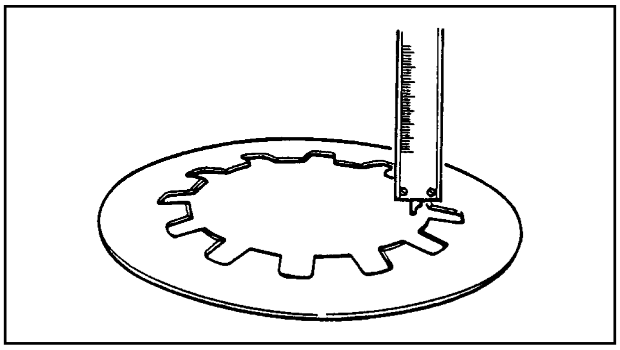
The following procedure applies to all of the clutch plates.

1. Check:
   - clutch plate
     Damage → Replace the clutch plates as a set.



2. Measure:
   - clutch plate warpage
     (with a surface plate and thickness gauge ①)
     Out of specification → Replace the clutch plates as a set.

Clutch plate warpage limit
Less than 0.1 mm

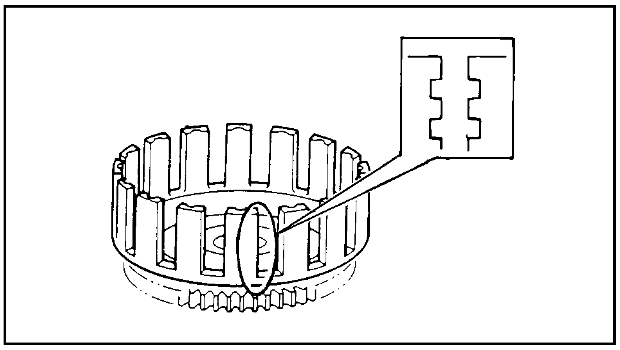


EAS00283

CHECKING THE CLUTCH SPRING AND CLUTCH SPRING SEAT PLATE

1. Check:
   - clutch spring plate
     Damage → Replace.
2. Check:
   - clutch spring plate seat
     Damage → Replace.
3. Measure:
   - clutch spring free height
     Out of specificatrion → Replace the clutch spring

Clutch spring free height
7.2 mm
<Limit>: 6.5 mm



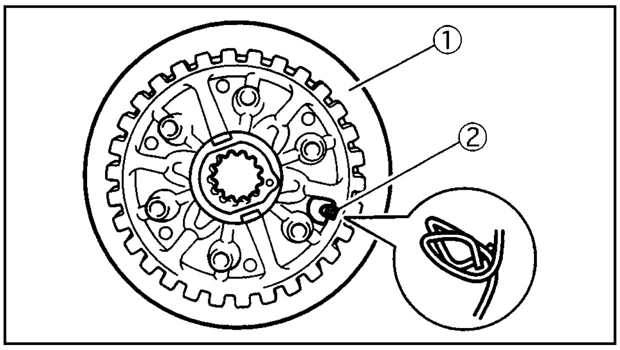
EAS00284

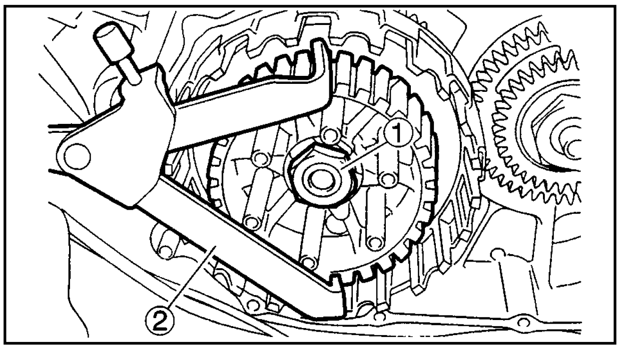
CHECKING THE CLUTCH HOUSING

1. Check:
   - clutch housing dogs
     Damage/pitting/wear → Deburr the clutch housing dogs or replace the clutch housing.

NOTE:

Pitting on the clutch housing dogs will cause erratic clutch operation.





EAS00295

INSTALLING THE CLUTCH

1. Install:
   - clutch housing ①

NOTE:
If the wire circlip ② has been removed, carefully install a new one as shown.

2. Tighten:
   - lock washer New
   - clutch boss nut ①

70 Nm (7.0 m•kg)

NOTE:
While holding the clutch boss with the clutch holding tool ②, tighten the clutch boss nut.

	Clutch holding tool **90890-04086**

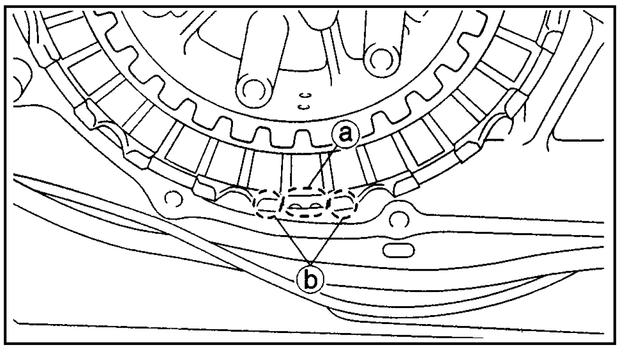
3. Bend the lock washer tab along a flat side of the nut.
4. Lubricate:
   - long clutch push rod
   - short clutch push rod
   (with the recommended lubricant)

	Recommended lubricant **Recommended lubricant**

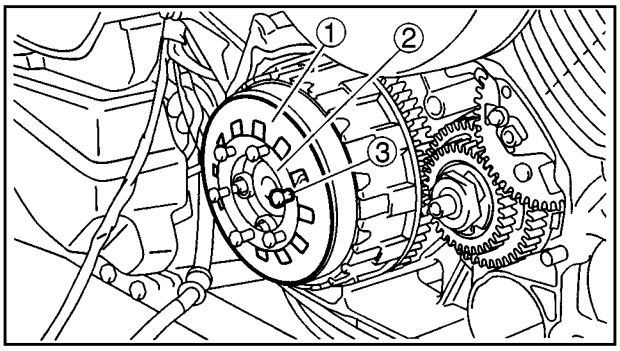
5. Lubricate:
   - friction plates
   - clutch plates
   (with the recommended lubricant)

	Recommended lubricant **Engine oil**

6. Install:
   - friction plates
   - clutch plates
   - long clutch push rod
   - short clutch push rod
   - bearing
   - washer



NOTE:
Make sure that the semicircular slot ⓐ in the friction plate is aligned with the mark ⓑ on the clutch housing.

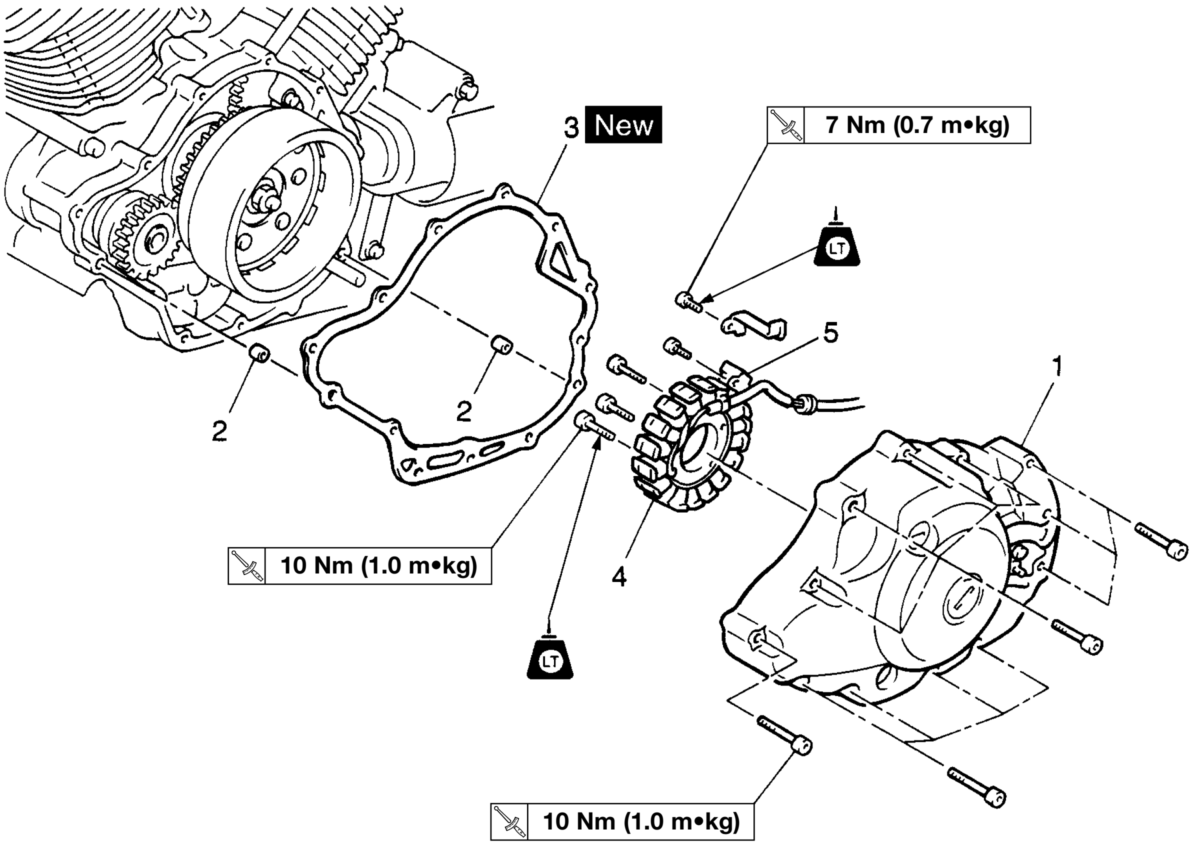


7. Install:
   - clutch pressure plate
   - clutch spring plate seat
   - clutch spring ①
   - clutch spring plate ②
   - clutch spring bolts ③

NOTE:
Tighten the clutch spring bolts in stages and in a crisscross pattern.

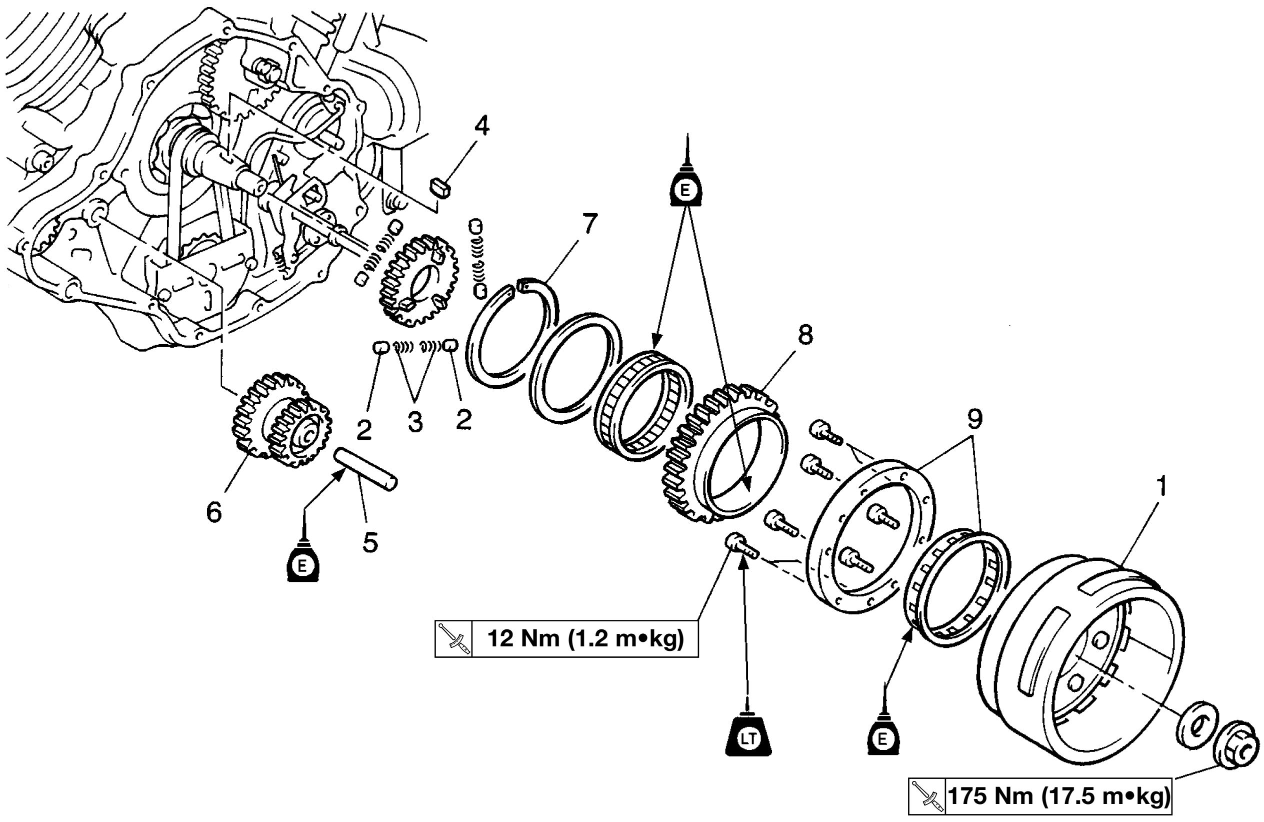
	Clutch spring bolt **8 Nm (0.8 m•kg)**

GENERATOR AND STARTER CLUTCH
STATOR COIL AND PICKUP COIL



Order	Job name/Part name	Q'ty	Remarks
	Removing the startor coil		Remove the parts in the order listed.
	Engine oil		Refer to "ENGINE OIL REPLACEMENT" in Chapter 3.
	Left side cover AC magneto lead/pickup lead/ sidestand switch lead Shift pedal Clutch adjusting cover/clutch cable		Refer to "ENGINE REMOVAL".
1	Left crankcase cover	1	
2	Dowel pins	2	
3	Gasket	1	
4	Stator coil	1	
5	Pickup coil	1	
			For installation, reverse the removal procedure.

GENERATOR AND STARTER CLUTCH



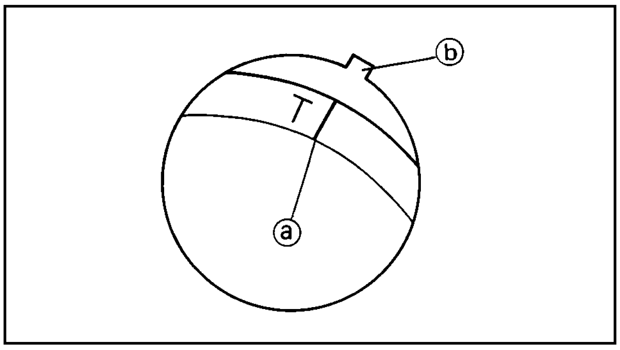
Order	Job name/Part name	Q'ty	Remarks
	Removing the generator and starter clutch		Remove the parts in the order listed.
1	Rotor	1	Refer to "REMOVING/INSTALLING THE GENERATOR".
2	Dowel pins	6	
3	Springs	6	
4	Woodruff key	1	
5	Shaft	1	
6	Starter idler gear	1	
7	Circlip	1	
8	Starter clutch drive gear	1	Refer to "INSTALLING THE GENERATOR".
9	Starter clutch assembly	1	
			For installation, reverse the removal procedure.

EAS00347

REMOVING THE GENERATOR

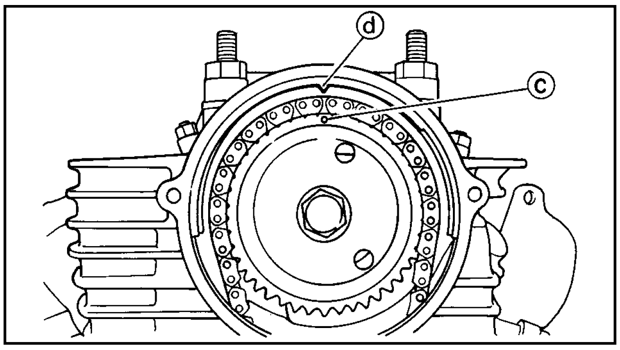
1. Remove:
   - camshaft sprocket cover
   - tappet covers

   Refer to "REAR CYLINDER HEAD".



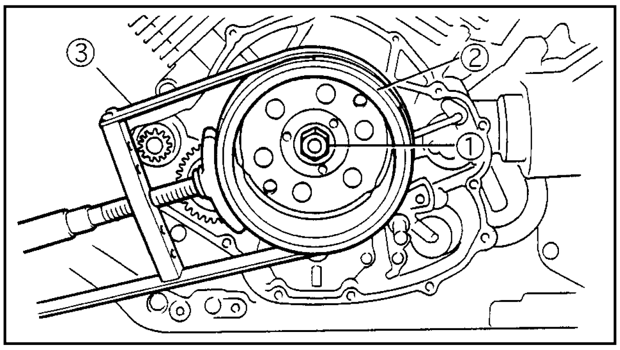
2. Align:
   - "T" mark ⓐ (with the stationary pointer ⓑ)

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a. Temporarily install the AC magneto cover without the pickup coil and stator coil.
b. Turn the crankshaft clockwise.
c. Align the "T" mark ⓐ with the stationary pointer ⓑ on the crankcase cover (left) when the rear piston is at TDC on the compression stroke.
d. Check that the rear piston is at TDC in the compression stroke.
e. The rear piston is at TDC on the compression stroke when there is clearance at both of the rocker arms. If there is no clearance then turn the crankshaft clockwise one full turn.
f. When the "T" mark ⓐ is aligned with the stationary pointer the punch mark ⓒ on the camshaft sprocket should be aligned with the stationary pointer ⓓ on the cylinder head.

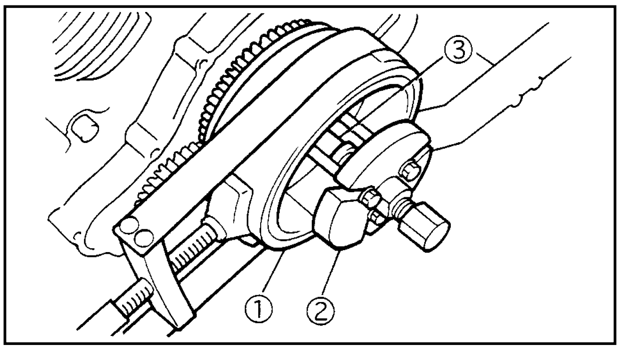
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3. Remove:
   - generator rotor nut ①
   - washer

NOTE:
- While holding the generator rotor ② with the sheave holder ③, loosen the generator rotor nut.
- Do not allow the sheave holder to touch the projection on the generator rotor.

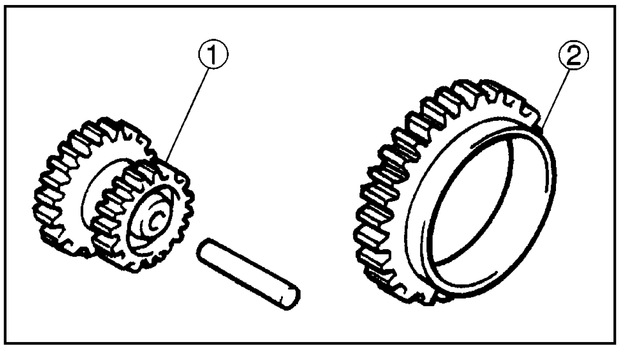
	Sheave holder **90890-01701**



4. Remove:
   - generator rotor ①
     (with the flywheel puller set ② and adapter ③)
   - woodruff key

NOTE:
- Remove the rotor by pushing back the rotor, the flywheel puller ② and the adapter ③.
- Install the flywheel puller bolts and tighten the center bolt, making sure that the tool body stays parallel to the rotor. If necessary, one holding bolt may be backed out slightly for realignment of the tool.
- When rotor is removed, the dowel pins and springs are scatter and dropping down. Do not missing them.

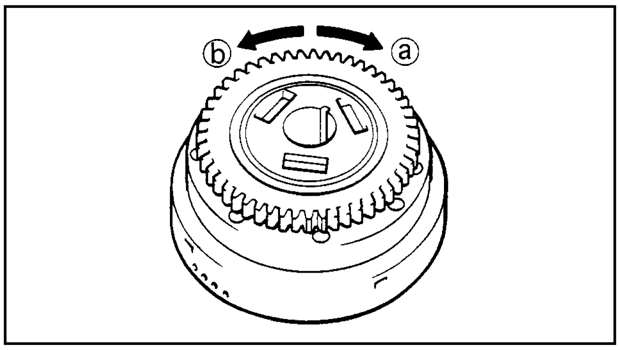
Sheave holder
90890-01701
Flywheel puller
90890-01362
Adapter
90890-04131



EAS00349

CHECKING THE STARTER CLUTCH

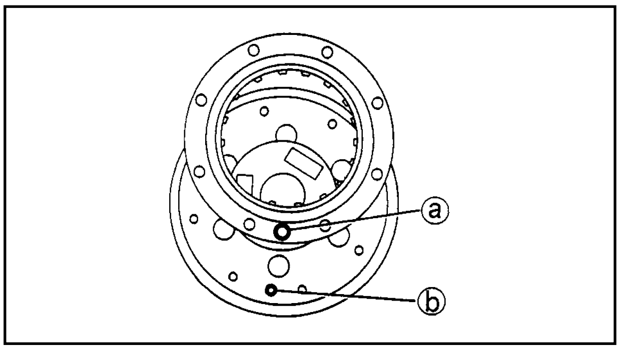
1. Check:
   - starter clutch idle gear ①
   - starter clutch drive gear ②
   Burrs/chips/roughness/wear → Replace the defective part(-s).
2. Check:
   - starter clutch operation



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a. When turning the starter clutch drive gear counter clockwise ⓑ, the starter clutch and the starter clutch drive gear should engage. If the starter clutch drive gear and starter clutch do not engage, the starter clutch is faulty and must be replaced.
b. When turning the starter clutch drive gear clockwise ⓐ, it should turn freely. If the starter clutch drive gear does not turn freely, the starter clutch is faulty and must be replaced.

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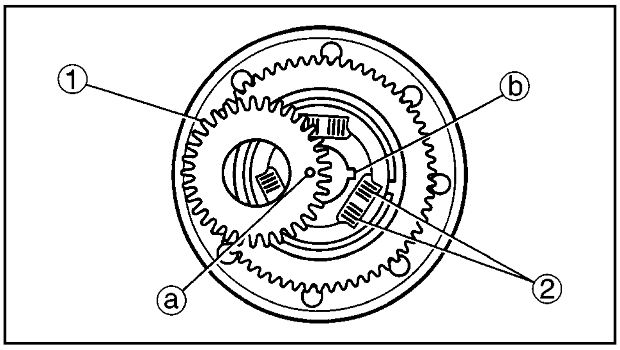


INSTALLING THE GENERATOR

1. Install:
   - starter clutch assembly

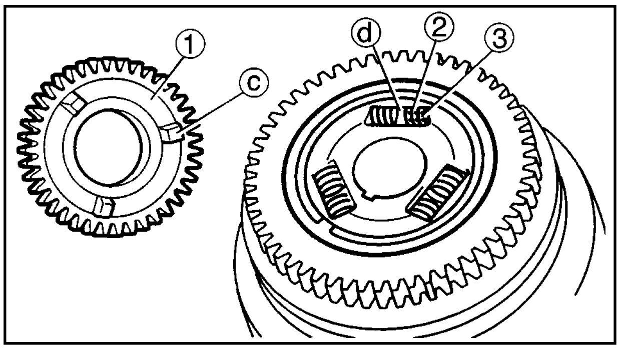
NOTE:
Align the hole ⓐ on the starter clutch housing with the hole ⓑ on the rotor.

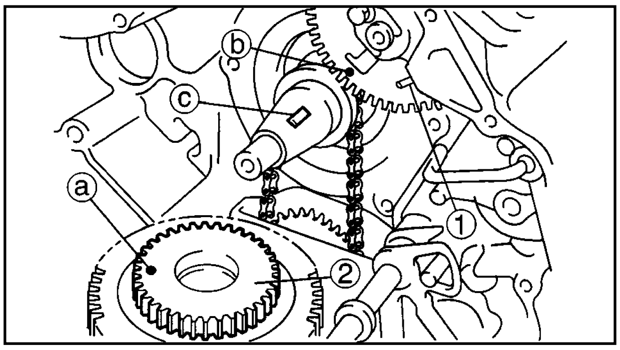
Starter clutch bolt:
12 Nm (1.2 m•kg)
LOCTITE®



2. Install:
   - timing drive gear ①
   - springs ②
   - dowel pins ③

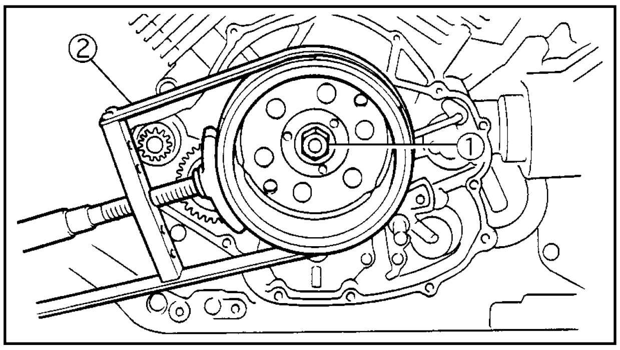
NOTE:
- Align the punch mark ⓐ on the timing drive gear with the key slide ⓑ.
- Push the projections ⓒ on the timing drive gear into the space ⓓ.





3. Install:
   - rotor assembly

NOTE:
- Insert the suitable pin ① into the hole of timing chain drive gear sprocket and match the gear teeth.
- Align the punch mark ⓐ on the timing drive gear ② the punch mark ⓑ on the timing chain drive gear sprocket and the key position ⓒ as shown.
- When installing the rotor, make sure the woodruff key is properly seated in the key way of the crankshaft.

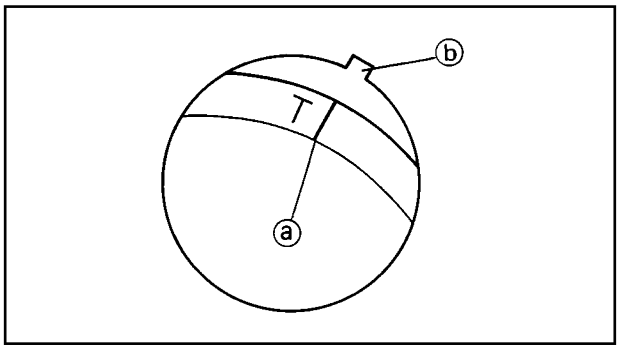


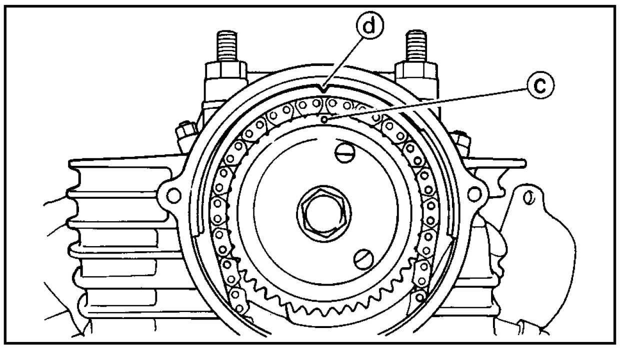
4. Tighten:
   - nut (rotor) ①

175 Nm (17.5 m•kg)

NOTE:
Tighten the rotor nut ① while holding the magneto rotor with a sheave holder ②.

Sheave holder:
90890-01701





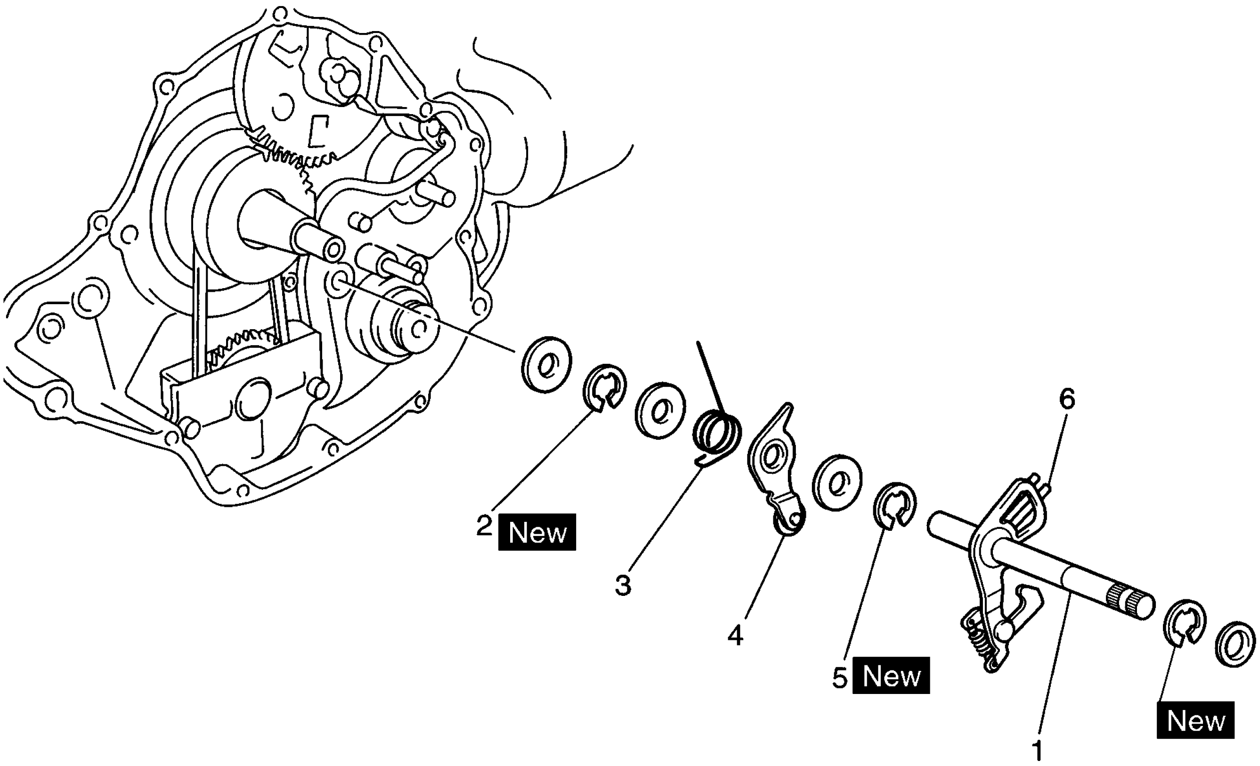
4. Check:
   • TDC on the compression stroke
   If the marks do not align → Adjust.

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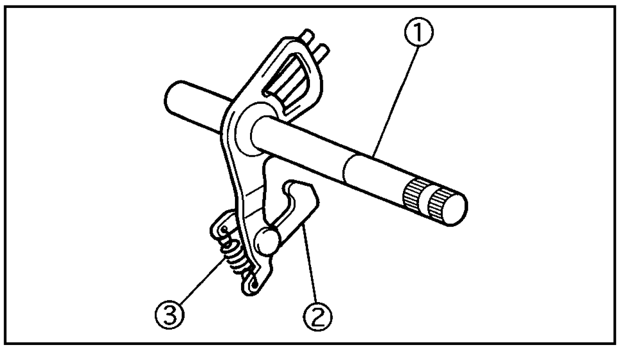
a. Align the "T" mark ⓐ with the stationary pointer ⓑ on the left crankcase cover.
b. When the "T" mark is aligned with the stationary pointer, the punch mark ⓒ on the camshaft sprocket should be aligned with the stationary pointer ⓓ on the cylinder head.

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SHIFT SHAFT



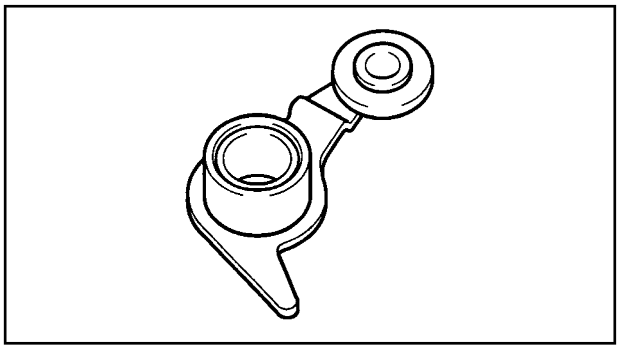
Order	Job name/Part name	Q'ty	Remarks
	Removing the shift shaft and stopper lever		Remove the parts in the order listed.
	Engine oil		Refer to "ENGINE OIL REPLACEMENT" in Chapter 3.
	Left crankcase cover		Refer to "GENERATOR AND STARTER CLUTCH".
	Rotor assembly		
1	Shift shaft	1	Refer to "INSTALLING THE SHIFT SHAFT".
2	Circlip	1	
3	Torsion spring (stopper lever)	1	
4	Stopper lever	1	
5	Circlip	1	
6	Torsion spring (shift shaft)	1	
			For installation, reverse the removal procedure.



EAS00328

CHECKING THE SHIFT SHAFT

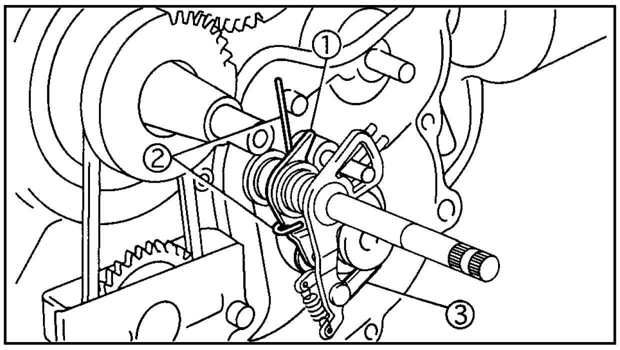
1. Check:
   - shift shaft ①
   - shift lever ②
     Bends/damage/wear → Replace.
   - shift lever spring ③
     Damage/wear → Replace.



EB408410

CHECKING THE STOPPER LEVER

1. Check:
   - stopper lever
     Bends/damage → Replace.
     Roller turns roughly → Replace the stopper lever.



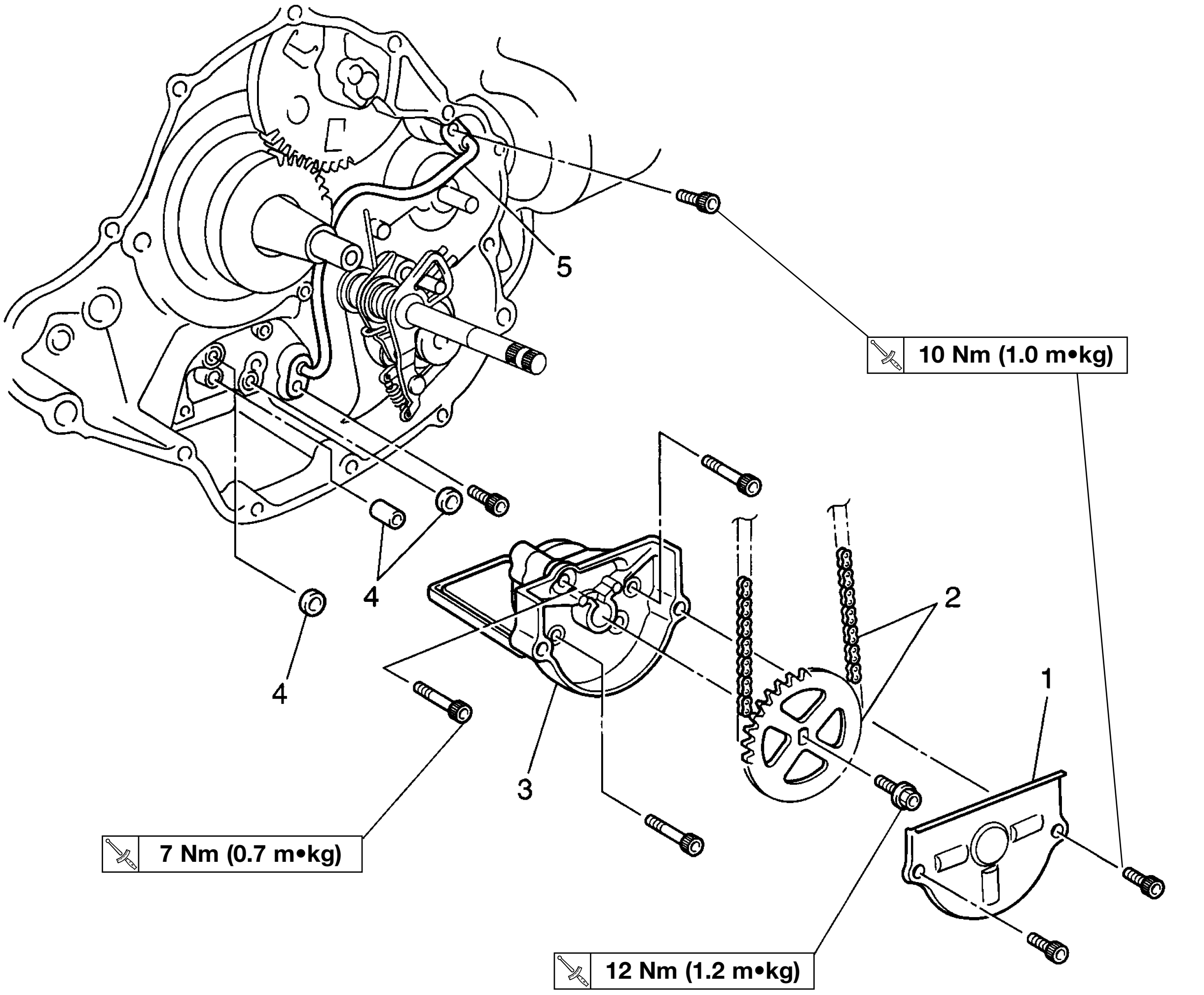
EAS00331

INSTALLING THE SHIFT SHAFT

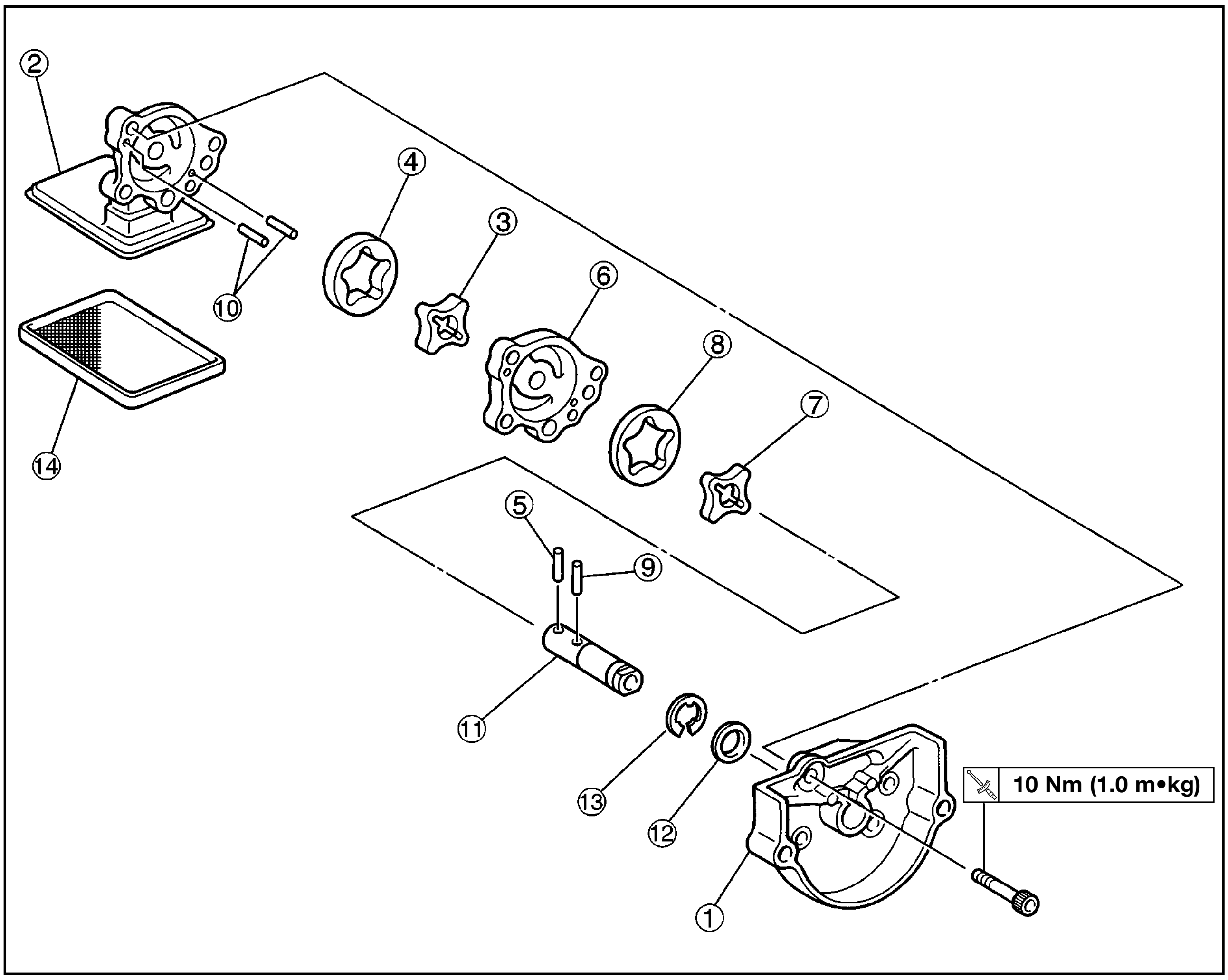
1. Install:
   - stopper lever ①
   - stopper lever spring ②
   - shift shaft lever ③

NOTE:
- Hook the ends of the stopper lever spring onto the stopper lever and the crankcase boss.
- Mesh the stopper lever with the shift drum segment assembly.

OIL PUMP



Order	Job name/Part name	Q'ty	Remarks
	Removing the oil pump		Remove the parts in the order listed.
	Rotor assembly		Refer to "GENERATOR AND STARTER CLUTCH".
	Crankcase cover (right)		Refer to " CLUTCH".
1	Driven gear cover	1	
2	Driven gear (oil pump)/ Oil pump drive chain	1/1	
3	Oil pump assembly	1	
4	O-rings/dowel pin	2/1	
5	Oil delivery pipe	1	
			For installation, reverse the removal procedure.

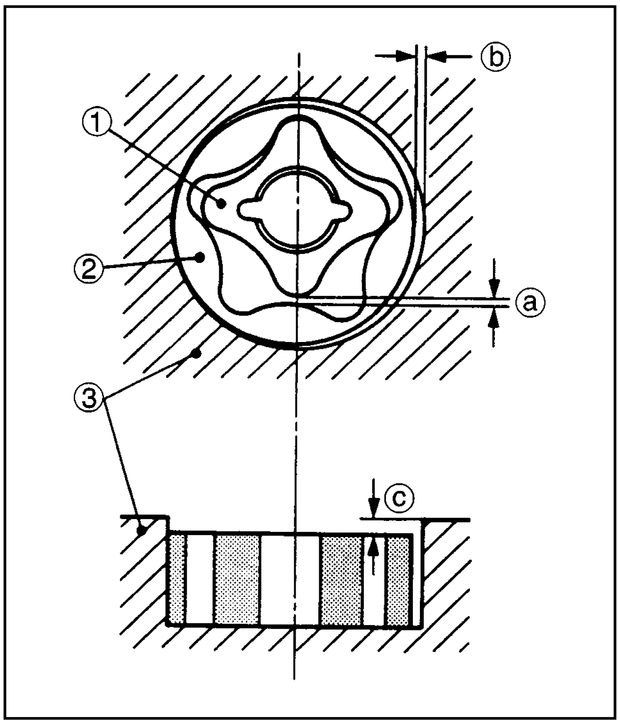


Order	Job name/Part name	Q'ty	Remarks
	Disassembling the oil pump		Disassembly the parts in the order listed.
①	Oil pump cover	1	
②	Oil pump body	1	
③	Oil pump rotor (inner)	1	Refer to "ASSEMBLING THE OIL PUMP".
④	Oil pump rotor (outer)	1	
⑤	Pin	1	
⑥	Oil pump body	1	
⑦	Oil pump rotor (inner)	1	Refer to "ASSEMBLING THE OIL PUMP".
⑧	Oil pump rotor (outer)	1	
⑨	Pin	1	
⑩	Dowel pins	2	
⑪	Oil pump shaft	1	
⑫	Washer	1	
⑬	Circlip	1	
⑭	Oil strainer	1	
			For assembly, reverse the disassembly procedure.

EAS00364

CHECKING THE OIL PUMP

1. Check:
   - oil pump driven gear
   - oil pump body
   - oil pump driven gear cover
   Cracks/damage/wear → Replace the defective part(-s).
2. Measure
   - inner-rotor-to-outer-rotor-tip clearance ⓐ
   - outer-rotor-to-oil-pump-body-side clearance ⓑ
   - oil-pump-body-to-inner-rotor-and-outer-rotor clearance ⓒ
   Out of specification → Replace the oil pump.

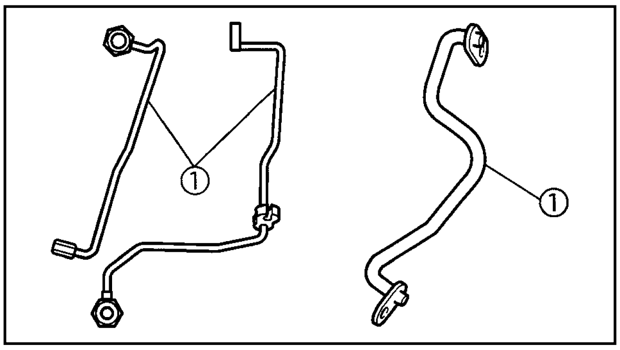


① Inner rotor
② Outer rotor
③ Oil pump body

Inner-rotor-to-outer-rotor-tip clearance
0.03 ~ 0.09 mm
<Limit>: 0.15 mm
Outer-rotor-to-oil-pump-body-side clearance
0.03 ~ 0.08 mm
<Limit>: 0.15 mm
Oil-pump-body-to-inner-rotor and outer-rotor clealance
0.03 ~ 0.08 mm
<Limit>: 0.15 mm

EAS00367

CHECKING THE OIL DELIVERY PIPES

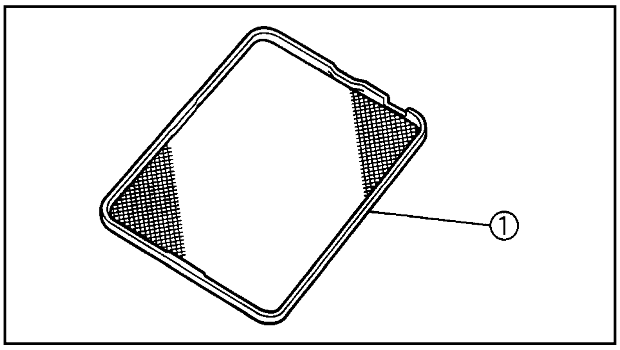


The following procedure applies to all of the oil delivery pipes.

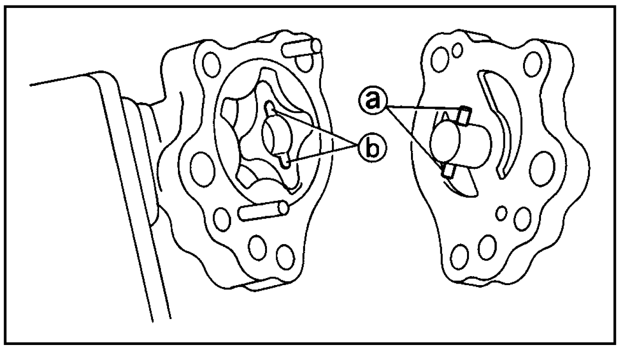
1. Check:
   - oil delivery pipes ①
   Damage → Replace.
   Obstruction → Wash and blow out with compressed air.

EAS00368

CHECKING THE OIL STRAINER



1. Check:
   - oil strainer ①
   Damage → Replace.
   Contaminants → Clean with engine oil.



EAS00376

ASSEMBLING THE OIL PUMP

1. Assemble:
   - oil pump

10 Nm (1.0 m•kg)

CAUTION:

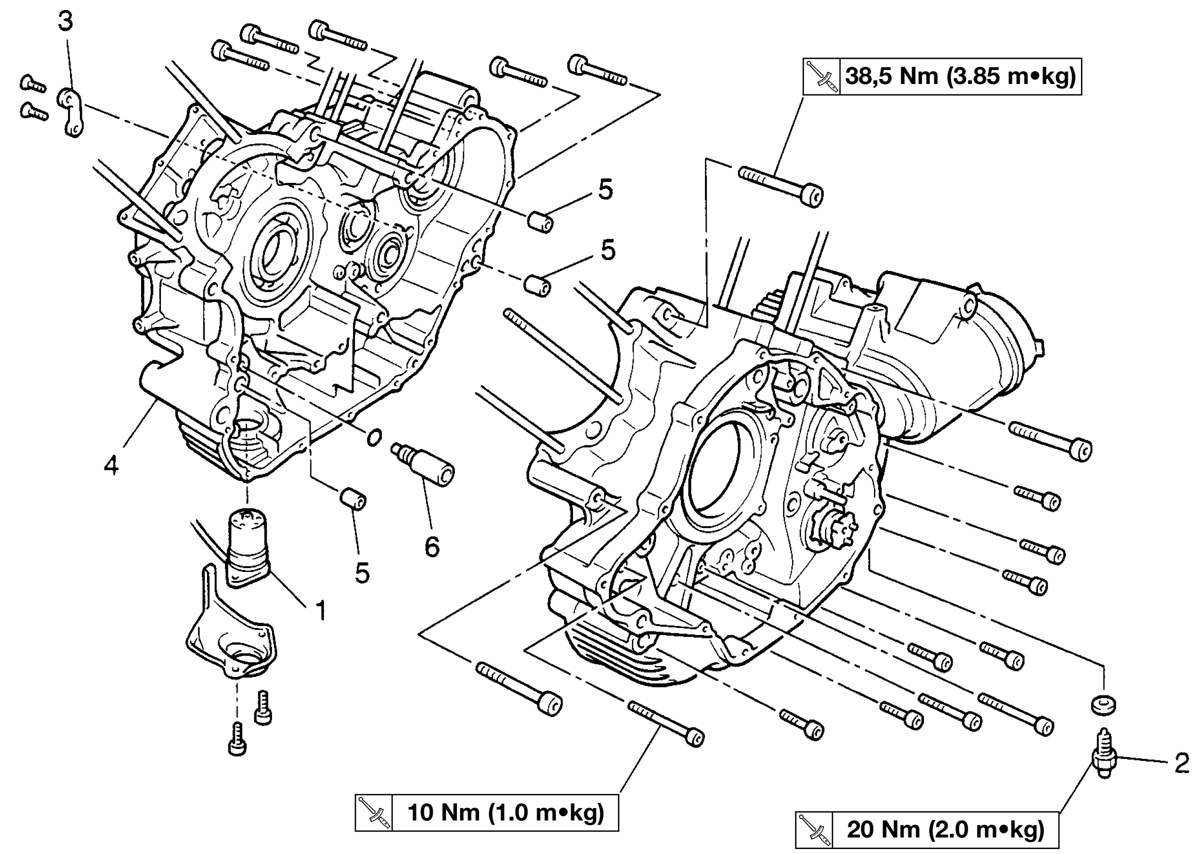
After tightening the bolts, make sure that the oil pump turns smoothly.

NOTE:

Align the pin ⓐ with the slots ⓑ on the inner rotor.

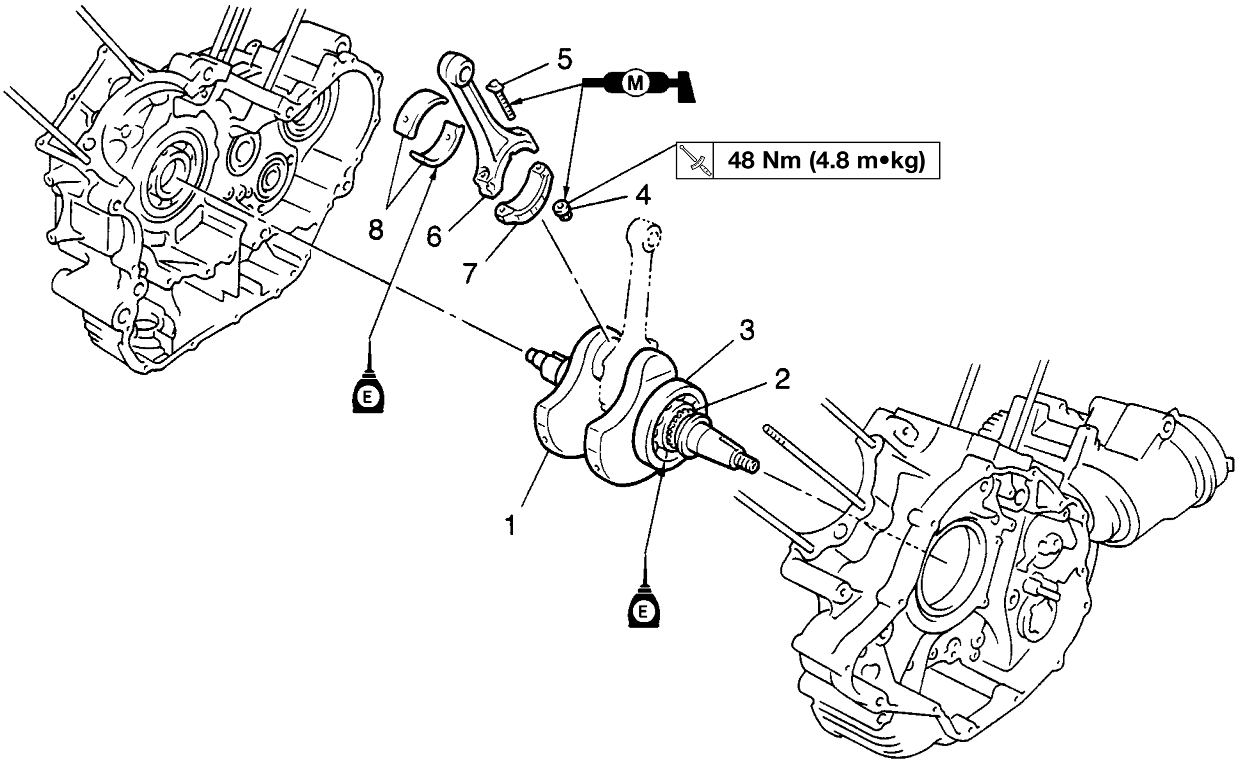
CRANKSHAFT AND CONNECTING RODS

CRANKCASE

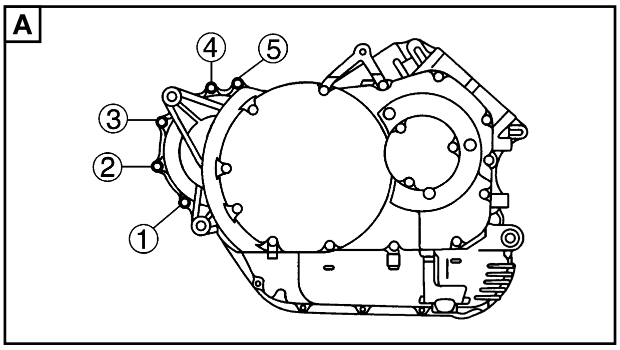


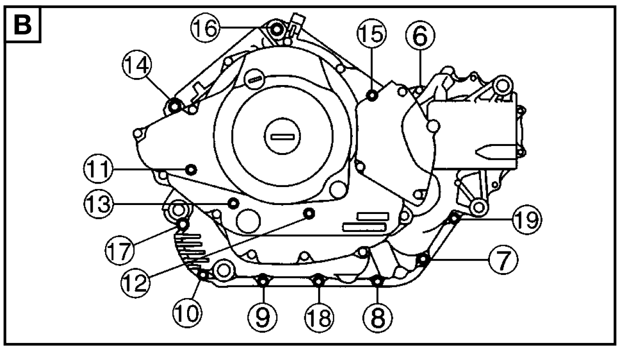
Order	Job name/Part name	Q'ty	Remarks
	Removing the crankshaft assembly		Remove the parts in the order listed.
	Engine assembly		Refer to "ENGINE REMOVAL".
	Cylinder head		Refer to "CYLINDER HEADS".
	Cylinder and piston		Refer to "CYLINDERS AND PISTONS".
	Clutch assembly		Refer to "CLUTCH".
	AC magneto and starter clutch		Refer to "GENERATOR AND STARTER CLUTCH".
	Shift shaft		Refer to "SHIFT SHAFT".
	Oil pump assembly		Refer to "OIL PUMP".
1	Oil level gauge	1	
2	Neutral switch	1	
3	Shift shaft stopper plate	1	Refer to "ASSEMBLING THE CRANKCASE".
4	Crankcase (right)	1	Refer to "DISASSEMBLING/ ASSEMBLING THE CRANKCASE".
5	Dowel pins	3	
6	Relief valve	1	
			For installation, reverse the removal procedure.

CRANKSHAFT AND CONNECTING RODS



Order	Job name/Part name	Q'ty	Remarks
	Removing the crankshaft and connecting rod		Remove the parts in the order listed.
1	Crankshaft assembly	1	Refer to "REMOVING/INSTALLING THE CRANKSHAFT".
2	Oil pump drive sprocket	1	
3	Bearing	1	
4	Nuts (connecting rod caps)	4	Refer to "INSTALLING THE CRANKSHAFT".
5	Connecting rod bolts	4	
6	Connecting rods	2	
7	Connecting rod caps	2	Refer to "REMOVING THE CONNECTING RODS/INSTALLING THE CRANKSHAFT".
8	Plain bearings	4	
			For installation, reverse the removal procedure.





EAS00386

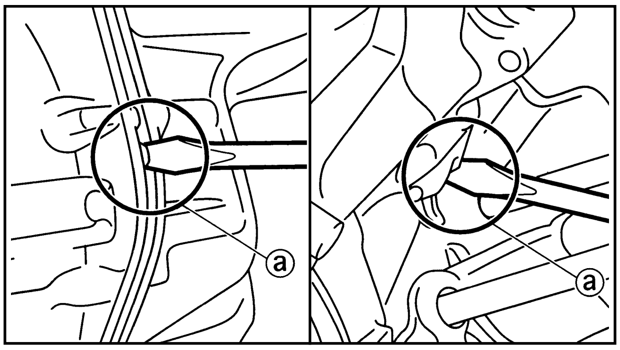
DISASSEMBLING THE CRANKCASE

1. Remove:
   - crankcase bolts

NOTE:

- Loosen each bolt 1/4 of a turn at a time, in stages and in a crisscross pattern. After all of the bolts are fully loosened, remove them.
- Loosen the bolts in decreasing numerical order (refer to the numbers in the illustration.)

[A] Right crankcase
[B] Left crankcase



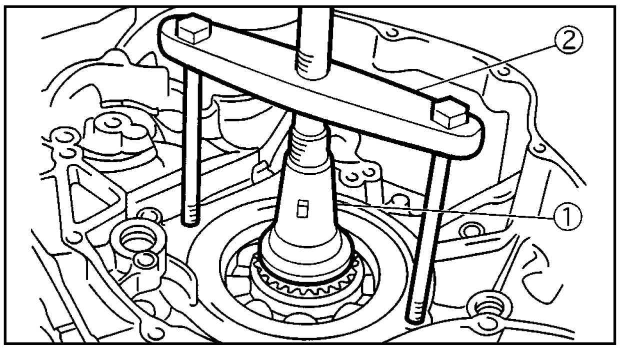
2. Remove:
   - crankcase

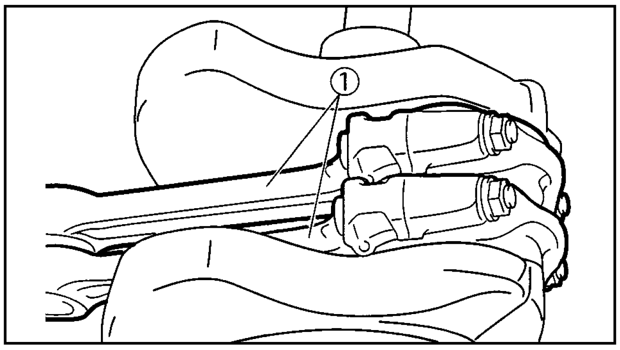
NOTE:

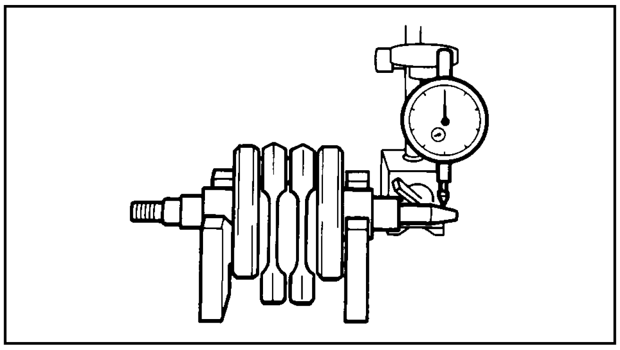
For this removal, slits ⓐ in the crankcase can be use as shown.

CAUTION:

Use a soft hammer to tap on one side of the crankcase. Tap only on reinforced portions of the crankcase. Do not tap on the crankcase mating surfaces. Work slowly and carefully. Make sure that the crankcase halves separate evenly.







EB412111

REMOVING THE CRANKSHAFT

1. Remove:
   - crankshaft assembly ①

NOTE:

- Remove the crankshaft assembly with the crankcase separating tool ②.
- Make sure that the crankcase separating tool is centered over the crankshaft assembly.

Crankcase separating tool
90890-01135

EB412121

REMOVING THE CONNECTING RODS

1. Remove:
   - connecting rods ①
   - big end bearings

NOTE:

Identify the position of each big end bearing so that it can be reinstalled in its original place.

EB413404

CHECKING THE CRANKSHAFT AND CONNECTING RODS

1. Measure:
   - crankshaft runout
     Out of specification → Replace the crankshaft.

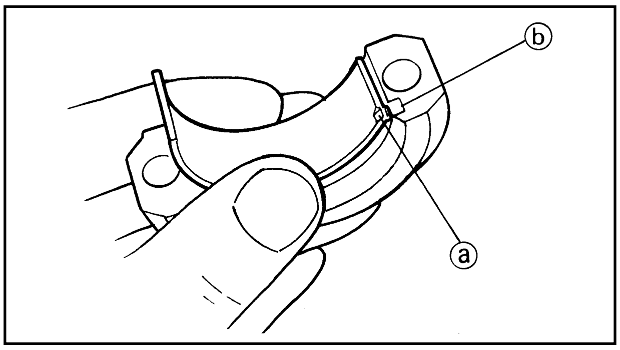
Crankshaft runout
Less than 0.02 mm

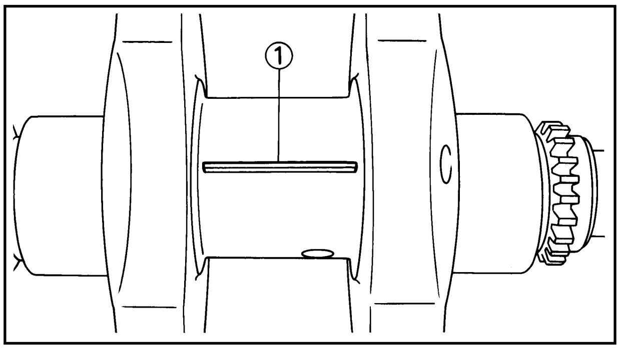
2. Check:
   - crankshaft journal surfaces
   - crankshaft pin surfaces
   - bearing surfaces
     Scratches/wear → Replace the crankshaft.
3. Measure:
   - crankshaft-pin-to-big-end-bearing clearance
     Out of specification → Replace the big end bearings.

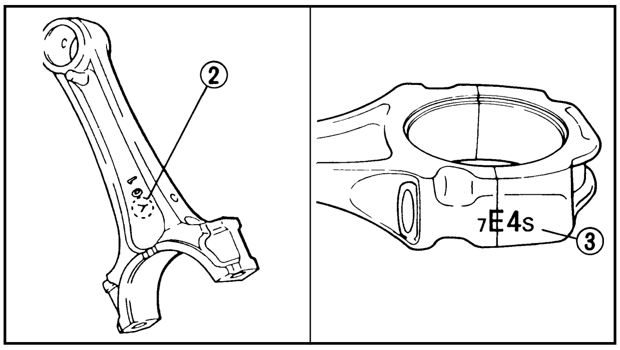
Crankshaft-pin-to-big-end-bearing clearance
0.044 ~ 0.073 mm

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The following procedure applies to all of the connecting rods.







CAUTION:

Do not interchange the big end bearings and connecting rods. To obtain the correct crankshaft-pin-to-big-end-bearing clearance and prevent engine damage, the big end bearings must be installed in their original positions.

a. Clean the big end bearings, crankshaft pins, and the inside of the connecting rod halves.
b. Install the big end upper bearing into the connecting rod and the big end lower bearing into the connecting rod cap.

NOTE:
Align the projections ⓐ on the big end bearings with the notches ⓑ in the connecting rod and connecting rod cap.

c. Put a piece of Plastigauge® ① on the crankshaft pin.
d. Assemble the connecting rod halves.

NOTE:
- Do not move the connecting rod or crankshaft until the clearance measurement has been completed.
- Apply molybdenum disulfide grease onto the bolts, threads, and nut seats.
- Make sure that the "Y" mark ② on the connecting rod faces towards the left side of the crankshaft.
- Make sure that the characters ③ on both the connecting rod and connecting rod cap are aligned.

e. Tighten the connecting rod nuts.

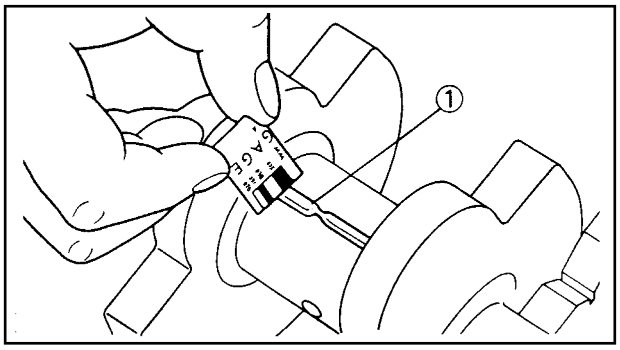
CAUTION:

- **When tightening the connecting rod nuts, be sure to use an F-type torque wrench.**
- **Without pausing, tighten the connecting rod nuts to the specified torque. Apply continuous torque between 4.3 and 4.8 m•kg. Once you reach 4.3 m•kg, DO NOT STOP TIGHTENING until the specified torque is reached. If the tightening is interrupted between 4.3 and 4.8 m•kg, loosen the connecting rod nut to less than 4.3 m•kg and start again.**

Refer to "INSTALLING THE CONNECTING RODS".

	Connecting rod nut **48 Nm (4.8 m•kg)**

f. Remove the connecting rod and big end bearings.
   Refer to "REMOVING THE CONNECTING RODS".
g. Measure the compressed Plastigauge ® width ① on each crankshaft pin.
   If the clearance is out of specification, select replacement big end bearings.

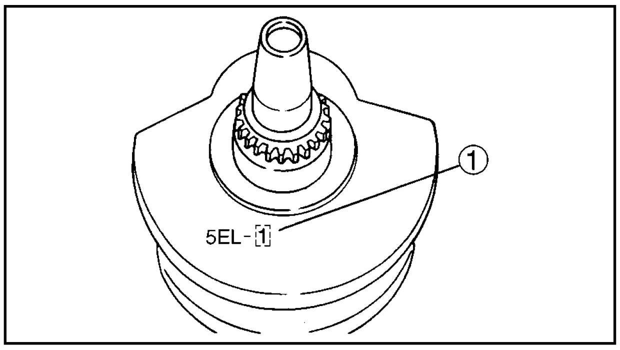


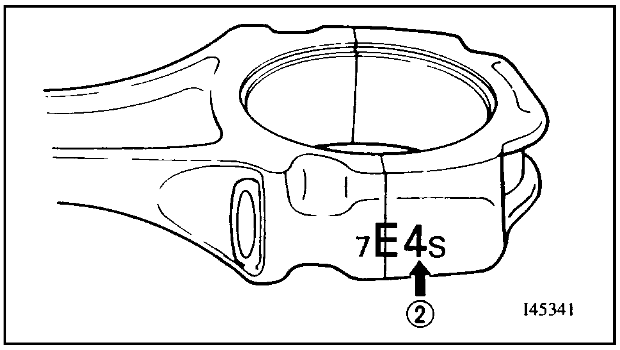
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4. Select:
   • big end bearings (P_1, P_2)

NOTE:

- The numbers ① stamped into the crankshaft web and the numbers ② on the connecting rods are used to determine the replacement big end bearing sizes.
- "P_1, P_2" refer to the bearings shown in the crankshaft illustration.





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For example, if the connecting rod "P_1" and the crankshaft web "P_1" numbers are "4" and "1" respectively, then the bearing size for "P_1" is:

Bearing size for "P_1" :
"P_1" (connecting rod) – "P_1" (crankshaft web) =
4 – 1 = 3 (brown)

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Rear cylinder lower bearing/Front cylinder upper and lower bearing.

BEARING COLOR CODE	
1	blue
2	black
3	brown
4	green
5	yellow

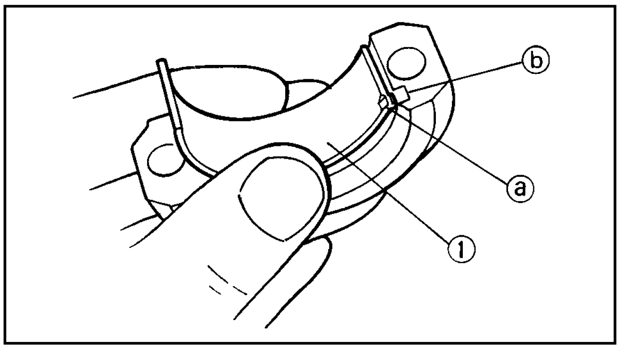
Rear cylinder upper bearing

<table>
<tr><th colspan="2">BEARING COLOR CODE</th></tr>
<tr><td>1</td><td rowspan="2">black</td></tr>
<tr><td>2</td></tr>
<tr><td>3</td><td>brown</td></tr>
<tr><td>4</td><td rowspan="2">green</td></tr>
<tr><td>5</td></tr>
</table>

EB412440

CHECKING THE BEARINGS AND OIL SEALS

1. Check:
   - bearings
     Clean and lubricate the bearings, then rotate the inner race with your finger
     Rough movement → Replace.
2. Check:
   - oil seals
     Damage/wear → Replace.

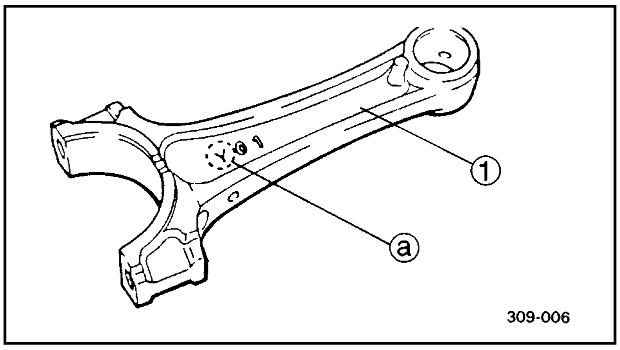


INSTALLING THE CRANKSHAFT

1. Install:
   - connecting rod bearings ①

NOTE:

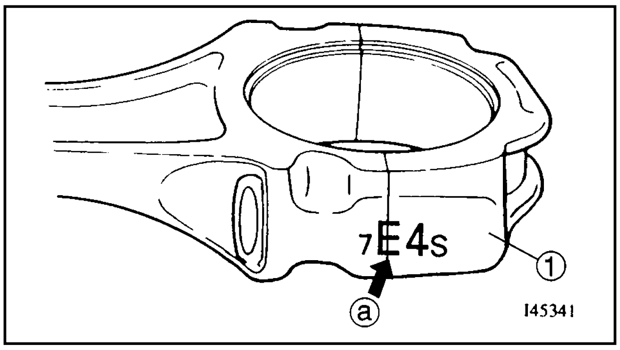
- Align the projection ⓐ of the bearings with the notches ⓑ in the connecting rod cap.
- Install each bearing in its original place.



2. Install:
   - connecting rods ①

NOTE:

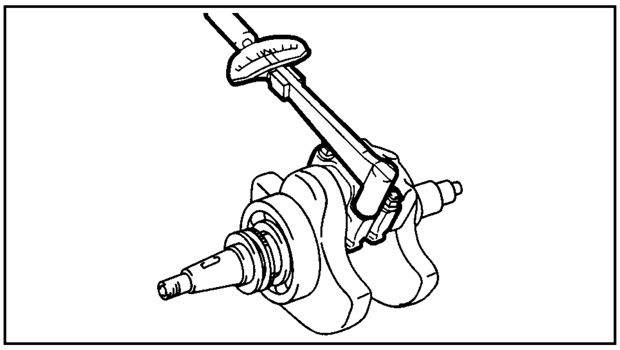
- The stamped "Y" mark ⓐ on the connecting rods should face towards the left side of the crankcase.
- Install each connecting rod in its original place.



3. Install:
   - connecting rod cap ①

NOTE:

Be sure that the characters ⓐ on the side of the cap and connecting rod are aligned.

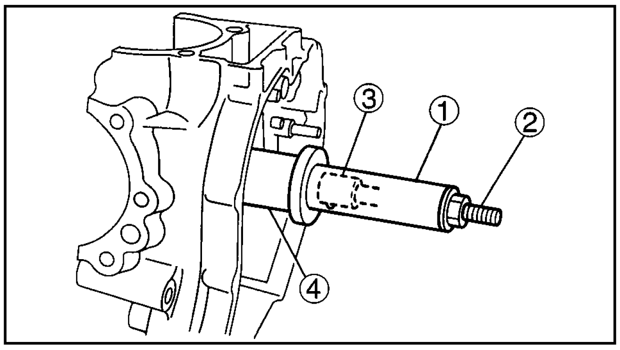


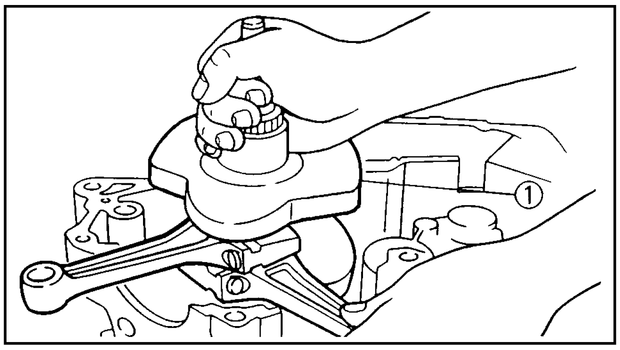
4. Tighten:
   - nuts (connecting rod cap)

48 Nm (4.8 m•kg)

NOTE:

Apply molybdenum disulfide grease to the rod cap bolt threads and nut surfaces.





CAUTION:

- **When tightening the nuts be sure to use an F-type torque wrench.**
- **Without pausing tighten to full torque specification. Apply continuous torque between 4.3 and 4.8 m•kg. Once you reach 4.3 m•kg DO NOT STOP TIGHTENING until final torque is reached. If the tightening is interrupted between 4.3 and 4.8 m•kg, loosen the nut to less than 4.3 m•kg and start again.**

5. Install:
   - crankshaft installing tool

NOTE:
Attach the spacer to the bearing inner race.

Crankshaft installer pot ①
90890-01274
Crankshaft installer bolt ②
90890-01275
Adapter ③
90890-04130
Spacer ④
90890-04060

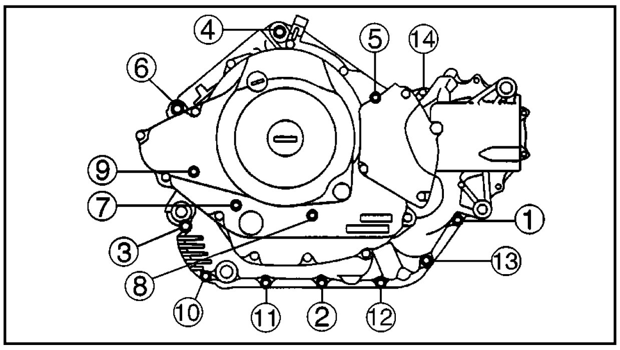
6. Install:
   - crankshaft ①

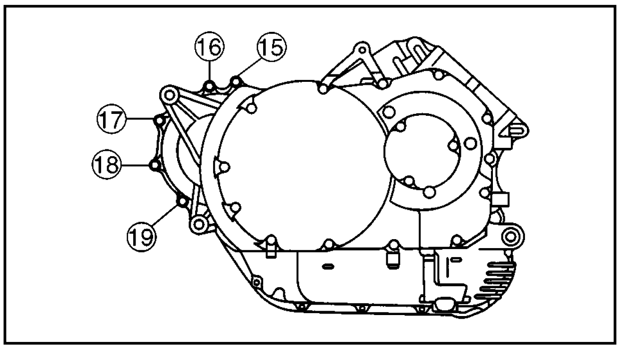
NOTE:
Align the left connecting rod with the rear cylinder sleeve hole.

ASSEMBLING THE CRANKCASE

1. Apply:
   - engine oil
     (onto the main journal bearings)
   - sealant
     (onto the crankcase mating surfaces)

Yamaha Bond No. 1215:
90890-85505





2. Tighten:
   - crankcase bolts
     (follow the proper tightening sequence)

NOTE:

The numbers embossed on the crankcase indicate the crankcase tightening sequence.

④ ~ ⑥ (M10) **38.5 Nm (3.85 m•kg)**

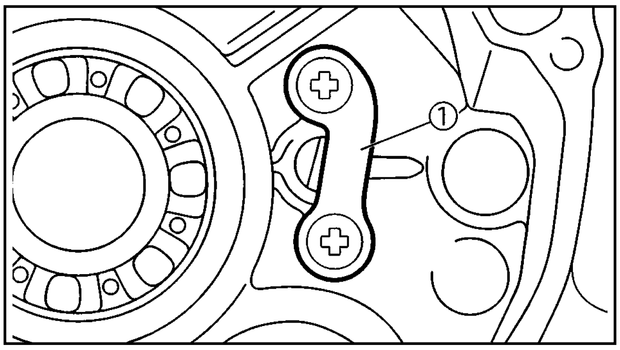
① ~ ③, ⑦ ~ ⑲ (M6) **10 Nm (1.0 m•kg)**

NOTE:

- Lubricate the bolt threads with engine oil.
- Tighten the bolts in increasing numerical order.

M6 × 30 mm	① ~ ③, ⑩ ~ ⑭, ⑰ ~ ⑲
M6 × 30 mm (Chromium plated bolt)	⑮, ⑯
M6 × 55 mm	⑧
M6 × 80 mm	⑦, ⑨
M10 × 60 mm	⑤
M10 × 70 mm	④
M10 × 100 mm	⑥

⑲: with engine ground lead

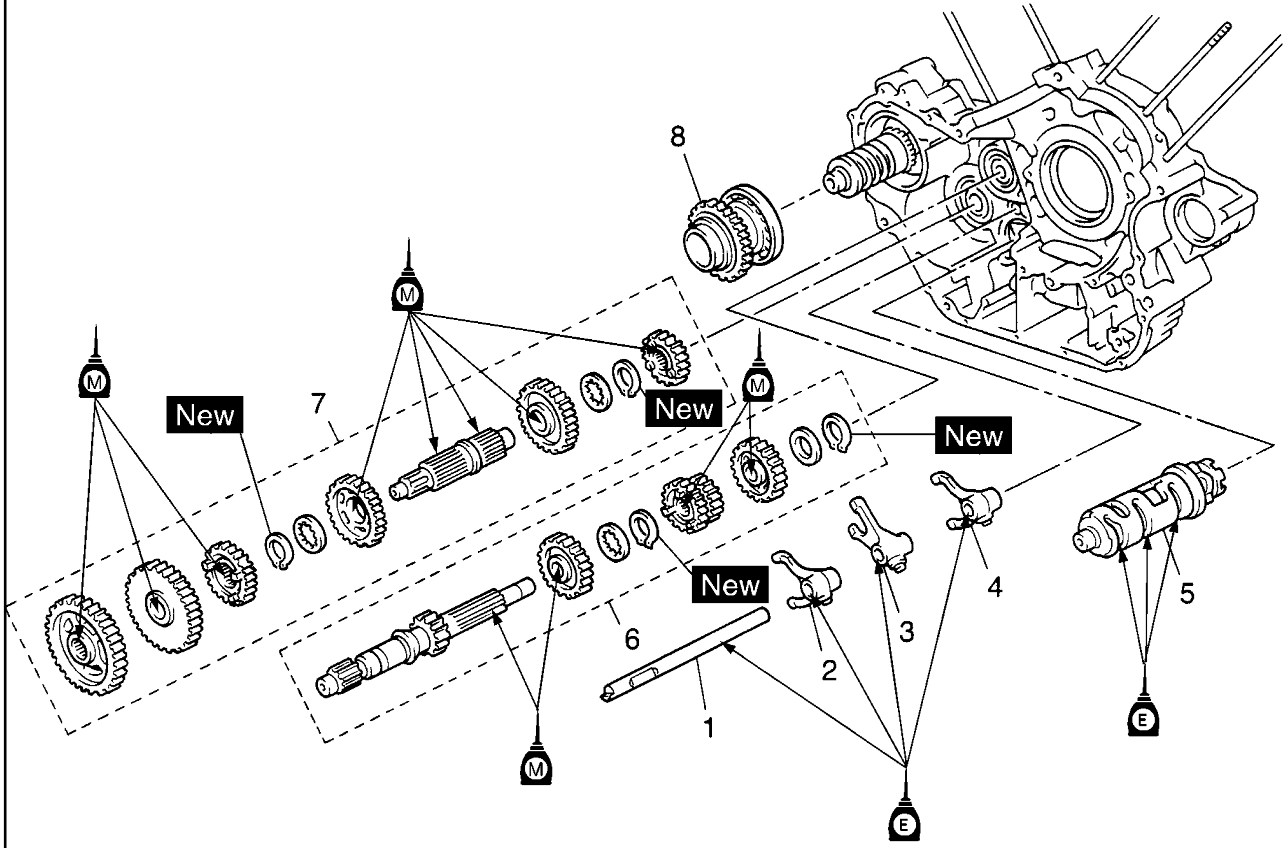


3. Install:
   - shift shaft stopper plate ①

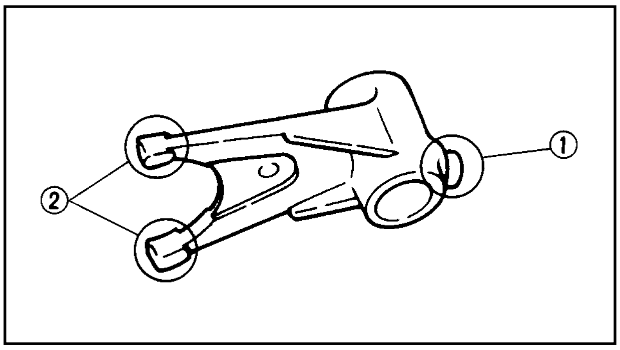
NOTE:

Install the shift shaft stopper plate as shown.

TRANSMISSION



Order	Job name/Part name	Q'ty	Remarks
	Transmission removal		Remove the parts in the order listed.
	Crankcase separation		Refer to "CRANKSHAFT".
1	Guide bar	1	Refer to "INSTALLING THE TRANSMISSION".
2	Shift fork 1 "R"	1	
3	Shift fork 2 "C"	1	
4	Shift fork 3 "L"	1	
5	Shift drum	1	
6	Main axle assembly	1	
7	Drive axle assembly	1	
8	Middle driven gear	1	
			For installation, reverse the removal procedure.

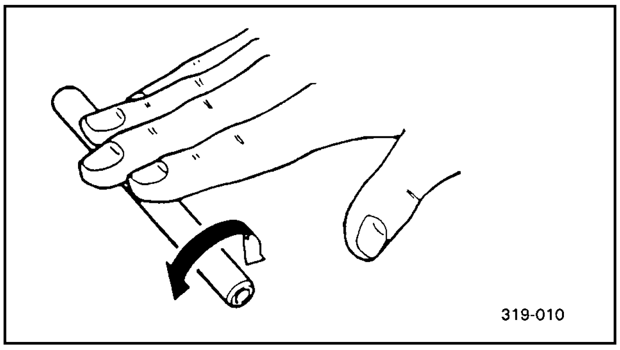


EAS00421

CHECKING THE SHIFT FORKS

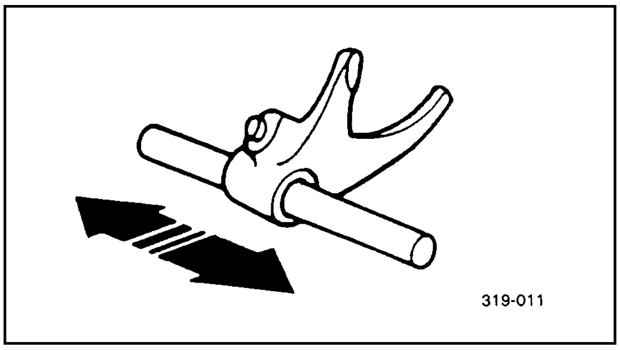
The following procedure applies to all of the shift forks and related components.

1. Check:
   - shift fork cam follower ①
   - shift fork pawl ②
   Bends/damage/scoring/wear → Replace the shift fork.
2. Check:
   - shift fork guide bar
   Roll the shift fork guide bar on a flat surface.
   Bends → Replace.

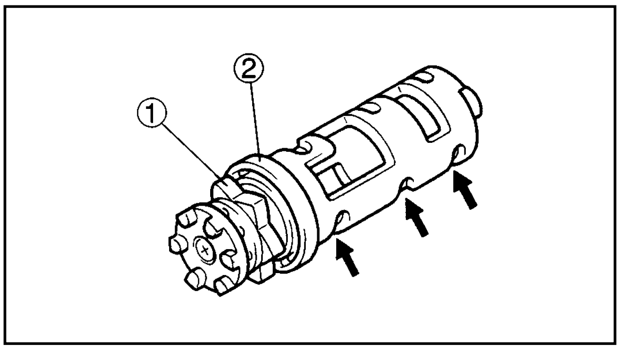


⚠ WARNING

Do not attempt to straighten a bent shift fork guide bar.



3. Check:
   - shift fork movement
   (on the shift fork guide bar)
   Rough movement → Replace the shift forks and shift fork guide bar as a set.



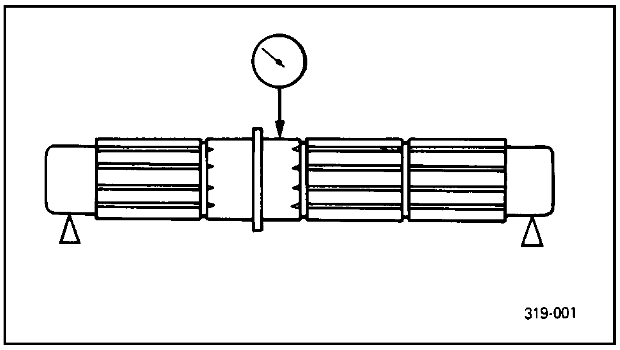
EAS00422

CHECKING THE SHIFT DRUM ASSEMBLY

1. Check:
   - shift drum grooves
   Damage/scratches/wear → Replace the shift drum.
   - shift drum segment ①
   Damage/wear → Replace.
   - shift drum bearing ②
   Damage/pitting → Replace.

EAS00424

CHECKING THE TRANSMISSION

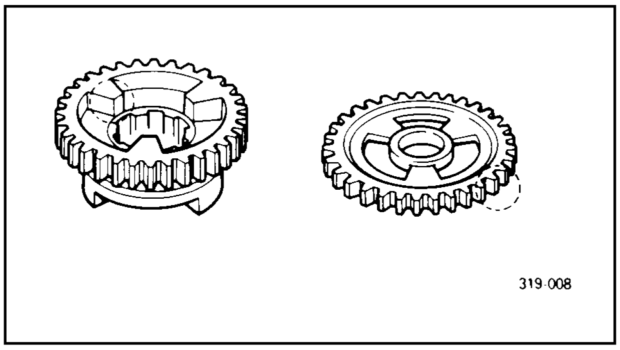


1. Measure:
   - main axle runout
     (with a centering device and dial gauge)
     Out of specification → Replace the main axle.

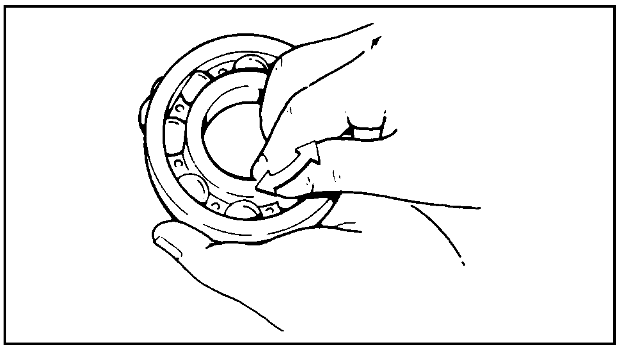
Main axle runout limit 0.08 mm

2. Measure:
   - drive axle runout
     (with a centering device and dial gauge)
     Out of specification → Replace the drive axle.

Drive axle runout limit 0.08 mm



3. Check:
   - transmission gears
     Blue discoloration/pitting/wear → Replace the defective gear(-s).
   - transmission gear dogs
     Cracks/damage/rounded edges → Replace the defective gear(-s).
4. Check:
   - transmission gear movement
     Rough movement → Replace the defective part(-s).
5. Check:
   - washers
     Damage/bends/looseness → Replace.



6. Check:
   - bearings
     Unsmooth → Replace.

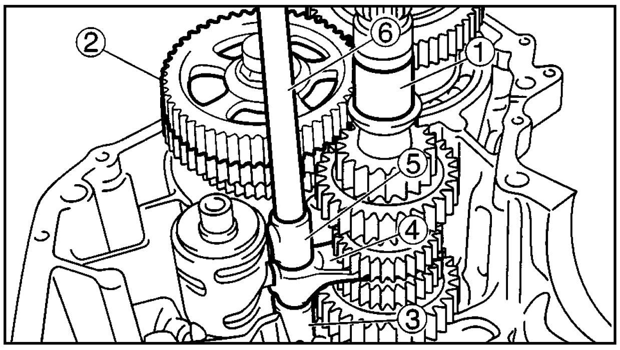
EAS00430

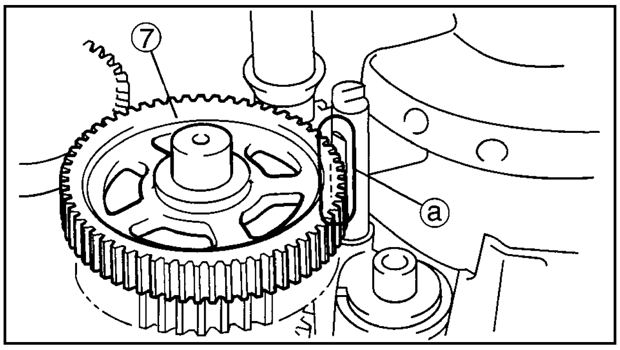
INSTALLING THE TRANSMISSION

1. Install:
   - shift drum assembly

NOTE:

Turn the shift drum assembly to the neutral position.





2. Install:
   - main axle assembly ①
   - drive axle assembly ②
   - shift fork "L" ③
   - shift fork "C" ④
   - shift fork "R" ⑤
   - shift fork guide bars ⑥

NOTE:

- The embossed marks on the shift forks should face towards the right side of the engine and be in the following sequence: "R", "C ", "L".
- When installing the middle drive gear ⑦, align the slit ⓐ on the guide bar with the middle drive gear.

⚠ WARNING

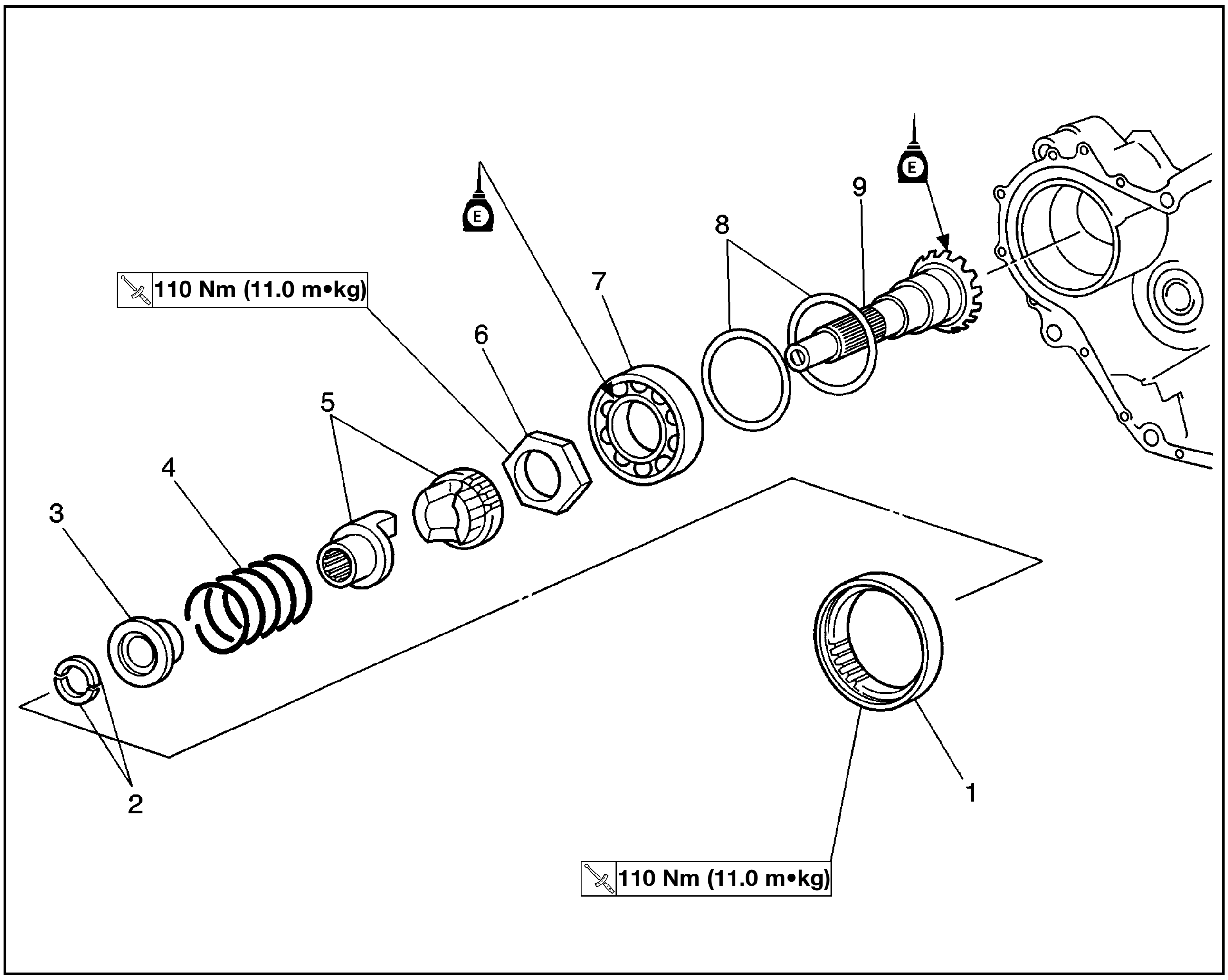
Always use new circlips.

3. Check:
   - transmission
     Rough movement → Repair.

NOTE:

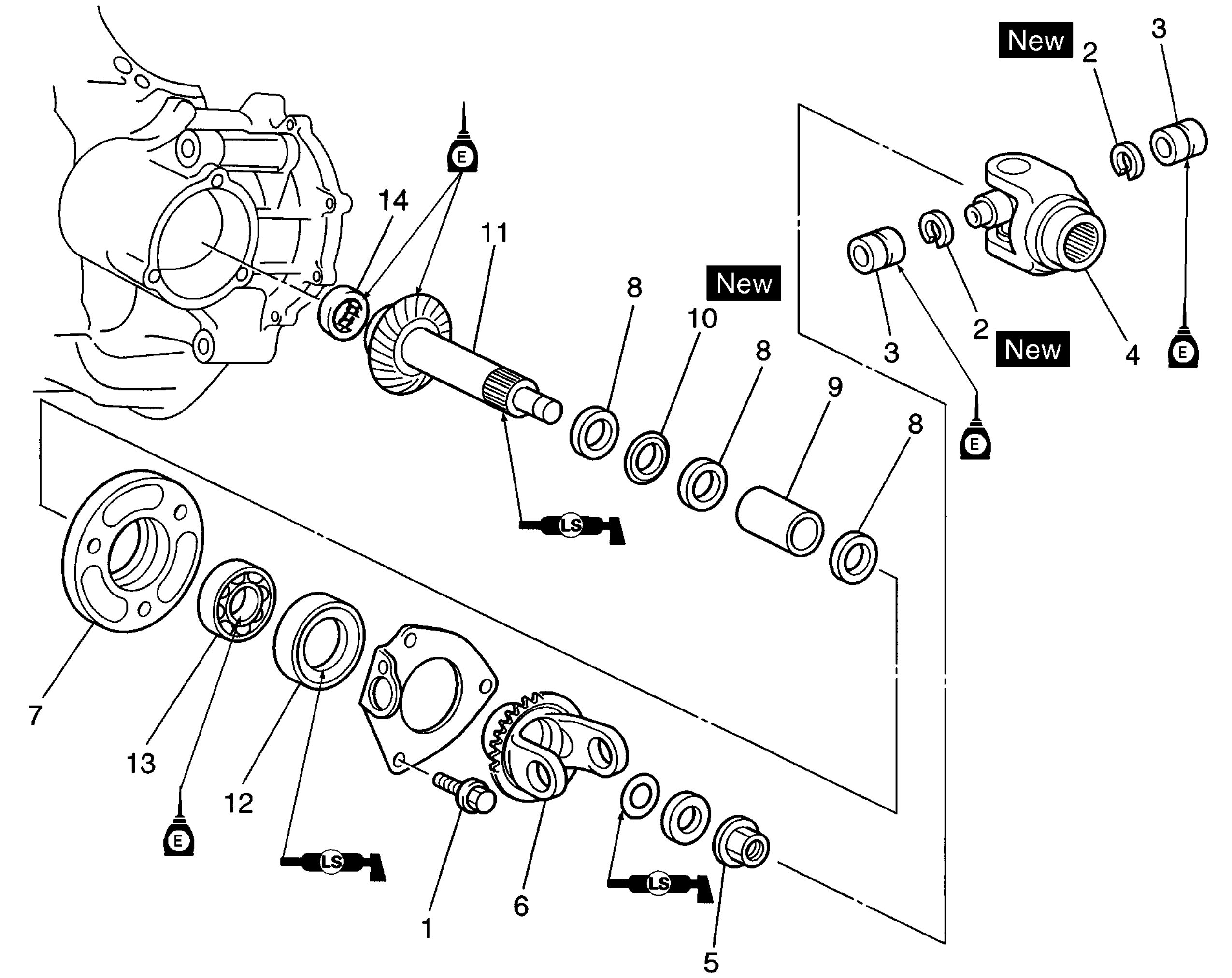
Oil each gear, shaft, and bearing thoroughly.

MIDDLE GEAR
MIDDLE DRIVE PINION GEAR

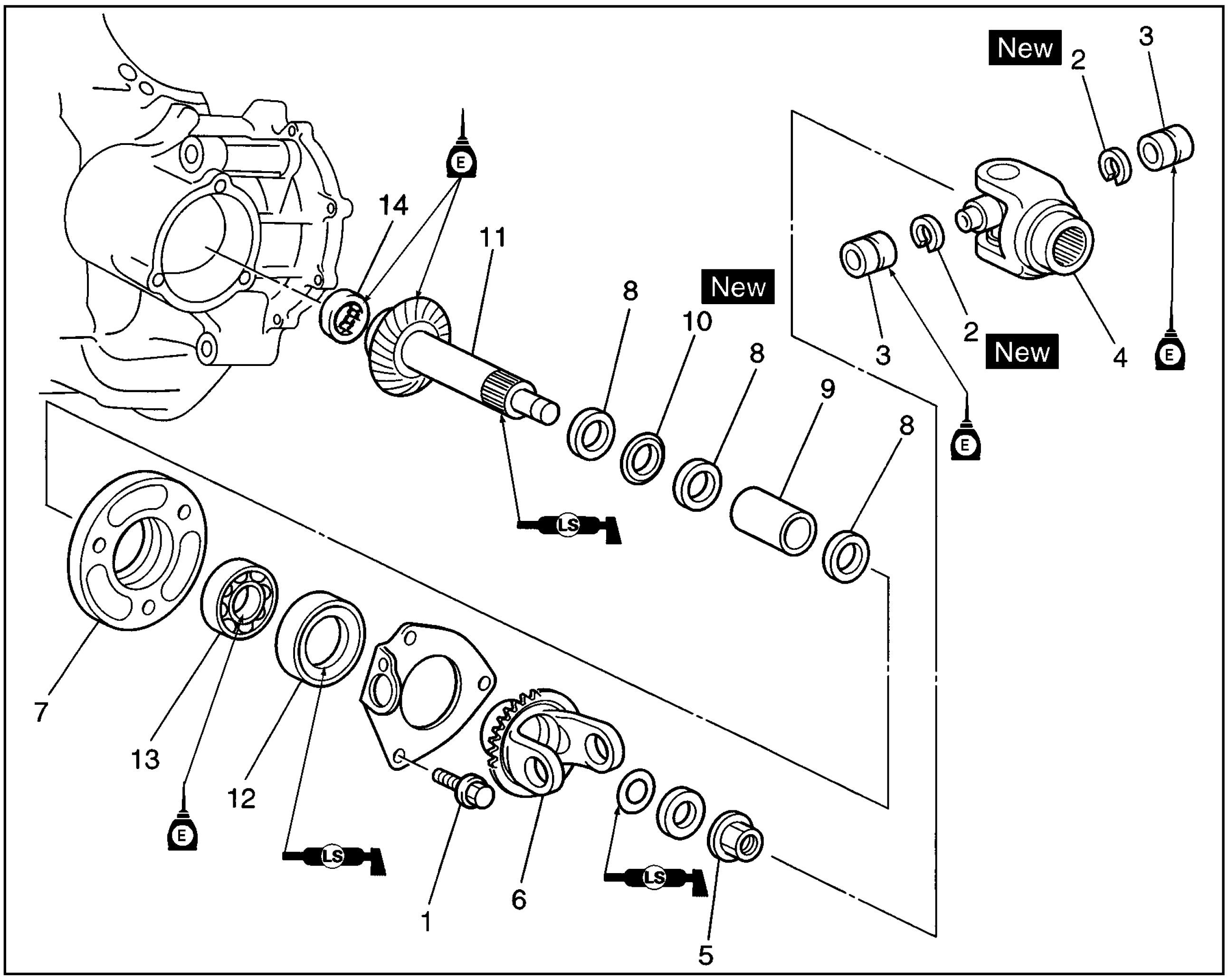


Order	Job name/Part name	Q'ty	Remarks
	Removing the middle drive pinion gear		Remove the parts in the order listed.
	Separate the crankcase		Refer to "CRANKSHAFT AND CONNECTING ROD".
1	Bearing retainer	1	Refer to "REMOVING THE MIDDLE DRIVE SHAFT ASSEMBLY/INSTALLING THE MIDDLE GEAR ASSEMBLY AND ADJUSTING THE BACKLASH".
2	Spring retainers	2	Refer to "DISASSEMBLING/ ASSEMBLING THE MIDDLE DRIVE SHAFT ASSEMBLY".
3	Spring seat	1	
4	Damper spring	1	
5	Damper cams	2	
6	Nut	1	
7	Bearing	1	
8	Shim(-s)	1	
9	Middle drive pinion shaft	1	
			For installation, reverse the removal procedure.

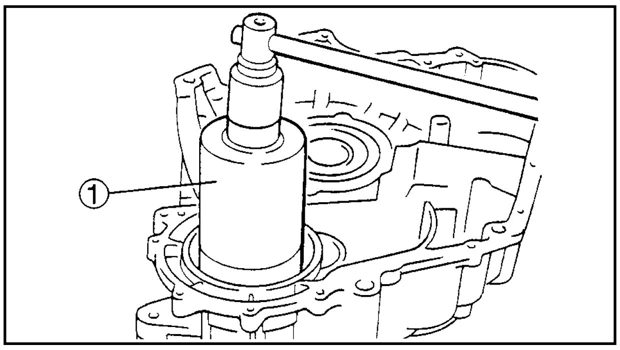
MIDDLE DRIVE PINION GEAR



Order	Job name/Part name	Q'ty	Remarks
	Removing the middle driven pinion gear		Remove the parts in the order listed.
1	Bolts	3	Refer to "REMOVING THE MIDDLE DRIVEN SHAFT ASSEMBLY/ INSTALLING THE UNIVERSAL JOINT".
2	Circlips	2	
3	Bearings	2	
4	Driven yoke	1	
5	Nut	1	Refer to "REMOVING THE MIDDLE DRIVEN SHAFT ASSEMBLY/INSTALLING THE MIDDLE GEAR ASSEMBLY AND ADJUSTING THE BACKLASH".
6	Drive yoke	1	Refer to "INSTALLING THE MIDDLE GEAR ASSEMBLY AND ADJUSTING THE BACKLASH".
7	Bearing housing/O-ring	1/1	
8	Washers	3	
9	Collar	1	



Order	Job name/Part name	Q'ty	Remarks
10	Collapsible collar	1	Refer to "INSTALLING THE MIDDLE GEAR ASSEMBLY AND ADJUSTING THE BACKLASH".
11	Middle driven shaft	1	
12	Oil seal	1	Refer to "ASSEMBLING THE MIDDLE DRIVEN SHAFT ASSEMBLY".
13	Bearing	1	
14	Bearing		
			For installation, reverse the removal procedure.



REMOVING THE MIDDLE DRIVE SHAFT ASSEMBLY

1. Remove:
   - bearing retainer
   - middle drive shaft assembly

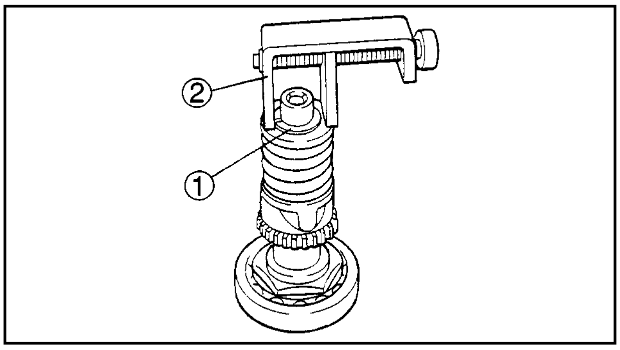
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a. Straighten the thread on the bearing retainer.
b. Attach the bearing retainer wrench ①.

	Bearing retainer wrench: **90890-04137**

c. Remove the bearing retainer and middle drive shaft assembly.

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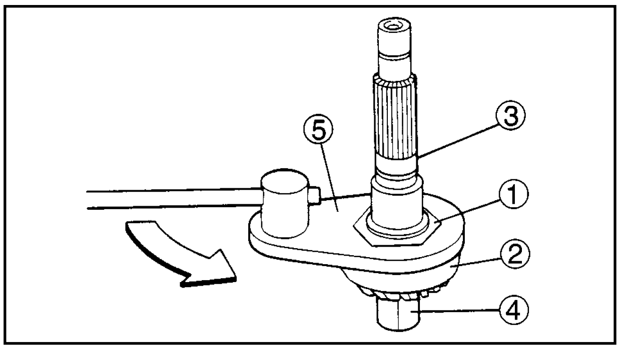


DISASSEMBLING THE MIDDLE DRIVE SHAFT ASSEMBLY

1. Remove:
   - spring retainers ①

NOTE:
While compressing the spring with a damper spring compressor ②, remove the spring retainers.

	Damper spring compressor **90890-04090**



2. Straighten the thread on the middle drive shaft nut.
3. Remove:
   - middle drive shaft nut ①
   - bearing ②
   - middle drive shaft ③

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a. Attach the middle drive shaft holder ④ onto the middle drive shaft as shown.

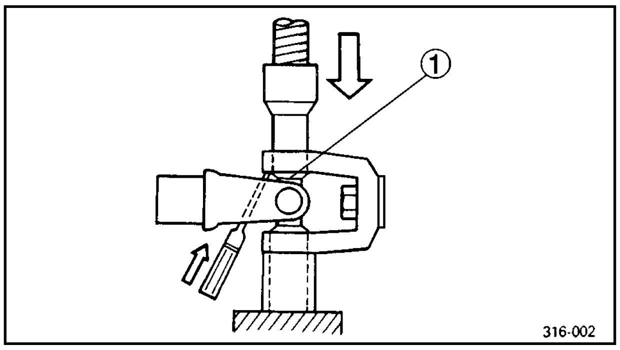
	Middle drive shaft holder **90890-04055**

b. Secure the middle drive shaft holder in a vice.
c. Loosen the middle drive shaft nut with the middle drive shaft nut wrench ⑤.

	Middle drive shaft nut wrench **90890-04138**

d. Remove the middle drive shaft nut and bearing.

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REMOVING THE MIDDLE DRIVEN SHAFT ASSEMBLY

1. Remove:
   - universal joint

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a. Remove the circlips ①.
b. Place the universal joint in a press.
c. With a pipe of the proper diameter positioned beneath the universal joint driven yoke as shown, press the bearing into the pipe.

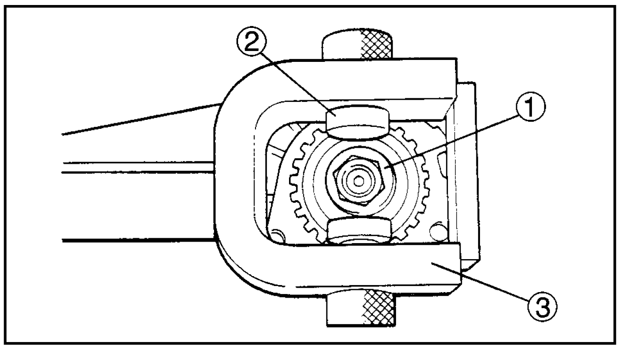
NOTE:

It may be necessary to lightly tap the universal joint driven yoke.

d. Repeat the above steps to remove the opposite side's bearing.
e. Separate the universal joint yokes.

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2. Loosen:
   - middle driven shaft nut ①



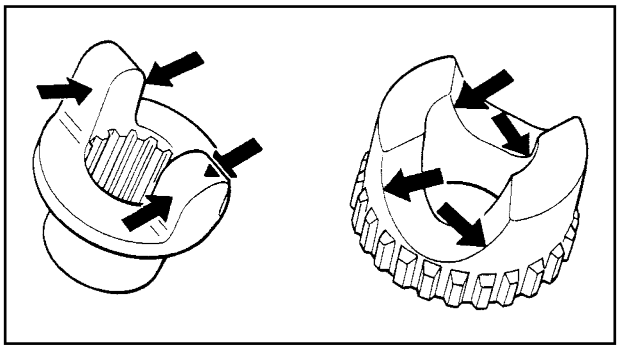
NOTE:

While holding the universal joint driven yoke ② with the universal joint holder ③, loosen the middle driven shaft nut.

	Universal joint holder 90890-04062

EAS00438

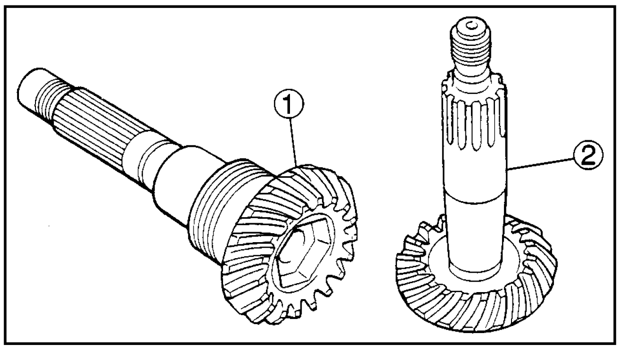
CHECKING THE MIDDLE DRIVE SHAFT ASSEMBLY



1. Check:
   - damper cam surface
     Scratches/wear → Replace the damper cam.
2. Check:
   - spring
     Cracks/damage → Replace.

EAS00439

CHECKING THE MIDDLE DRIVEN SHAFT ASSEMBLY

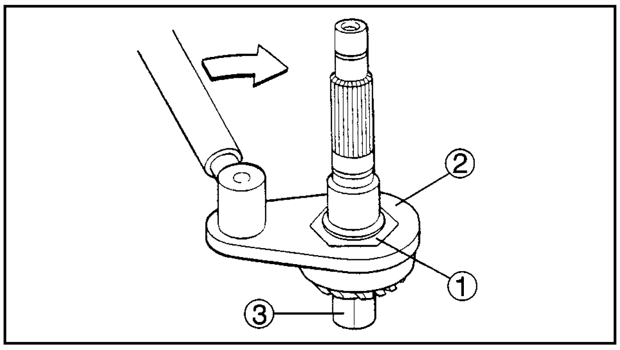


1. Check:
   - middle drive gear ①
   - middle driven gear ②
     Galling/pitting/wear → Replace the middle driven shaft assembly.
2. Check:
   - bearings
     Damage/pitting → Replace the middle drive shaft bearing housing assembly.

3. Check:
   - O-ring
   - oil seal

   Damage → Replace the defective part(-s).
4. Check:
   - universal joint movement

   Rough movement → Replace the universal joint.



EAS00441

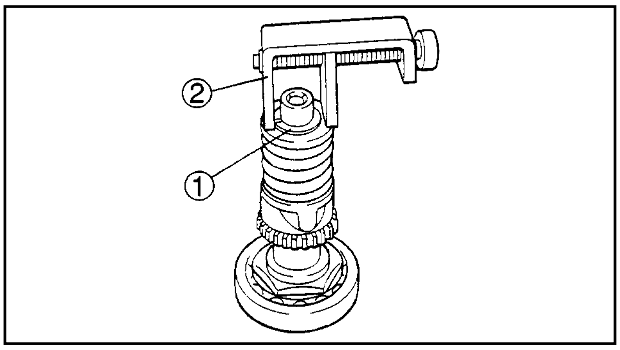
ASSEMBLING THE MIDDLE DRIVE SHAFT ASSEMBLY

1. Tighten:
   - middle drive shaft nut ①

110 Nm (11.0 m•kg)

NOTE:
- Set the torque wrench at a right angle to the middle drive shaft nut wrench ②.
- Lock the threads on the middle drive shaft nut by staking them with a center punch.

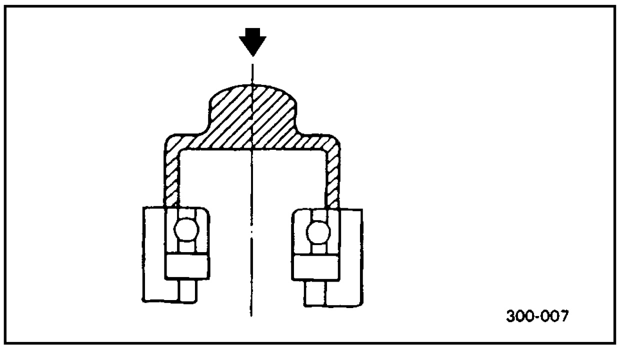
Middle drive shaft nut wrench ②
90890-04138
Middle drive shaft holder ③
90890-04055



2. Install:
   - spring retainers ①

NOTE:
While compress the spring with the damper spring compressor ②, and then install the spring retainers.

Damper spring compressor
90890-04090



ASSEMBLING THE MIDDLE DRIVEN SHAFT ASSEMBLY

NOTE:
The following points are critical when assembling the middle gears:
- The collapsible collar must be replaced whenever the middle driven shaft assembly is removed from the middle driven shaft bearing housing.
- When performing this procedure for the first time, be sure to have at least one extra collapsible collar on hand.

1. Install:
   - bearing outer race
     (into the middle driven shaft bearing housing)

⚠ WARNING

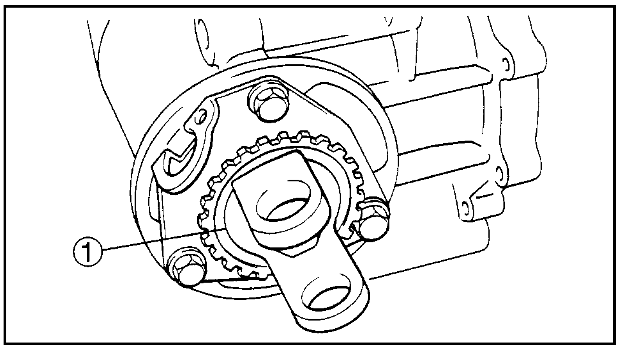
Do not press the bearing outer race. During installation, always press the bearing inner race carefully.

2. Install:
   - middle driven shaft nut

NOTE:
Finger tighten the middle driven shaft mut

INSTALLING THE MIDDLE GEAR ASSEMBLY AND ADJUSTING THE BACKLASH

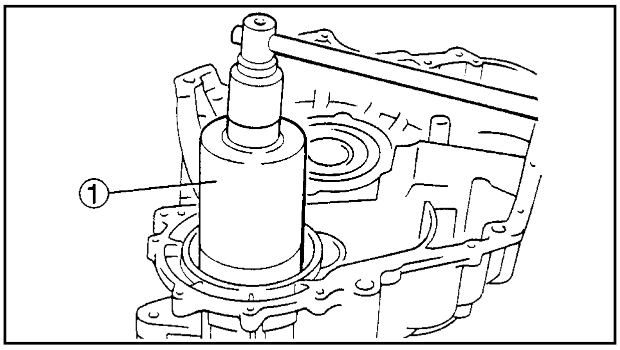
NOTE:
When installing the middle gear assembly, be sure to replace the following parts:
- collapsible collar.



1. Install:
   - middle driven shaft assembly ①

25 Nm (2.5 m•kg)

2. Install:
   - shim
   - middle drive shaft assembly



3. Install:
   - bearing retainer

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Install steps:

- Attach the bearing retainer wrench ①

	Bearing retainer wrench: **90890-04137**

- Tighten the bearing retainer.

	Bearing retainer: **110 Nm (11.0 m•kg)**

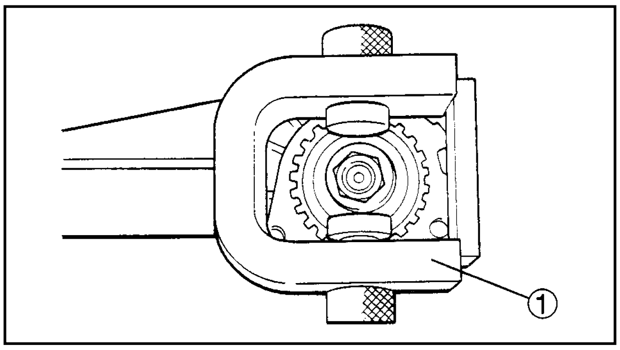
- Lock the threads on the bearing retainer by staking them with a center punch.

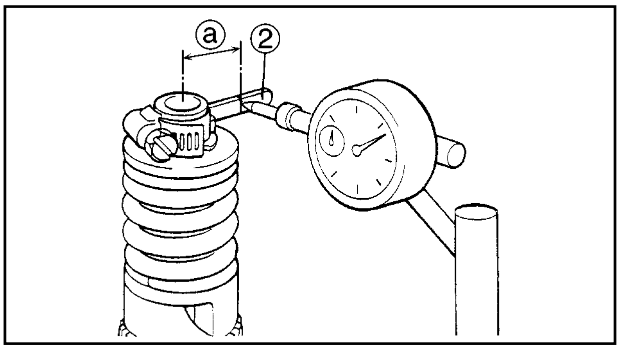
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4. Adjust:
   - middle gear backlash

	Middle gear backlash: **0.1 ~ 0.2 mm**

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a. Install the universal joint holder ① and middle gear backlash band ② as shown.

	Universal joint holder **90890-04062** **Middle gear backlash band** **90890-01231**

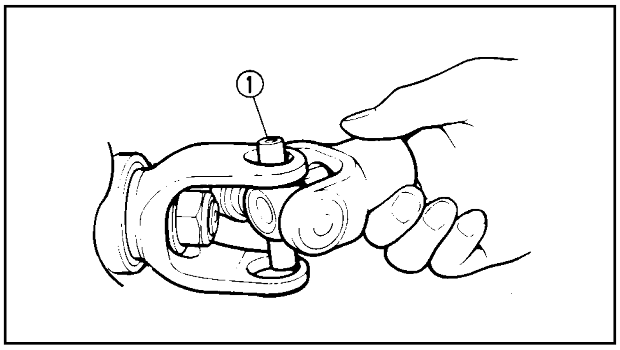
b. Make sure that the dial gauge plunger on the middle gear backlash band as shown.
   ⓐ Dial-gauge-plunger contact point: 68.2 mm
c. Remove the middle driven pinion gear nut and apply the LOCTITE® on it.
d. Reinstall the middle driven pinion gear nut.
e. While measure the middle gear backlash, tighten the middle driven pinion gear nut until specific backlash.

CAUTION:

Do not over tighten the middle driven pinion gear nut. If over tighten the middle driven pinion gear nut, replace the collapsible collar and adjust the backlash.

f. Stake the middle driven pinion gear shaft thread.

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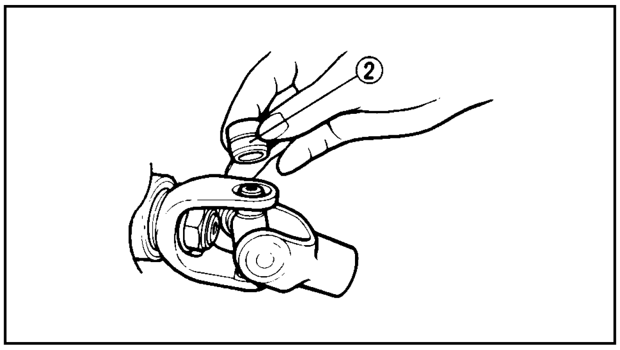


INSTALLING THE UNIVERSAL JOINT

1. Install:
   - universal joint driven yoke/cross joint ① (into the universal joint drive yoke)

CAUTION:

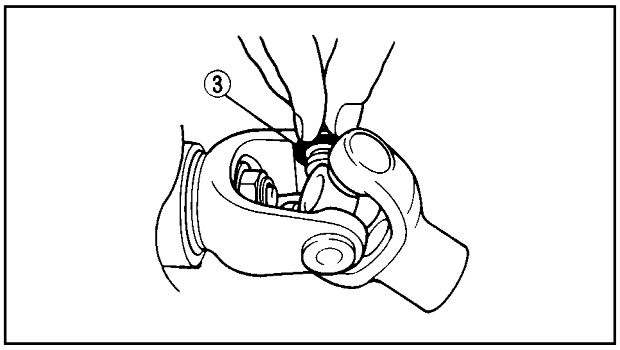
Do not hammer the universal joint drive yoke or the collapsible collar may be distorted. This will result in a change in the standard spinning torque, requiring replacement of the collapsible collar and reassembly of the middle driven shaft assembly.



2. Install:
   - bearings ② (onto the universal joint driven yoke/cross joint)

CAUTION:

The needles can easily fall out of their races, so check each bearing carefully. Slide the universal joint driven yoke assembly back and forth on the bearings. If a needle is out of place, the yoke will not go all the way onto the bearings.



3. Press each bearing into the universal joint driven yoke assembly with a socket of the proper size.

NOTE:

The bearings must be inserted far enough into the universal joint driven yoke assembly so that circlips ③ can be installed.

EAS00452

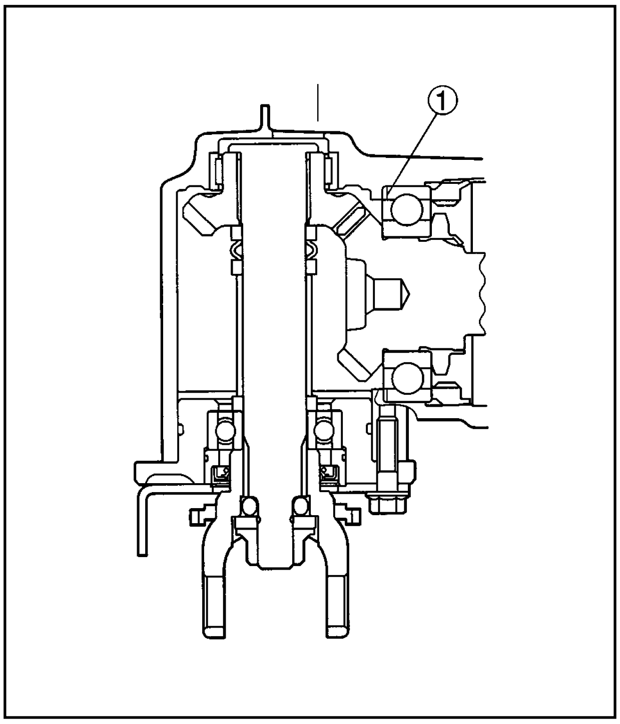
ALIGNING THE MIDDLE GEAR

NOTE:

Aligning the middle gear is necessary when any of the following parts are replaced:

- Crankcase
- Middle drive shaft

1. Select:
   - middle drive gear shim(-s) ①



NOTE:

Select the middle drive gear shim(-s) ① by calculating the middle drive gear shim thickness and then measuring the middle gear backlash.

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a. Position the middle drive gear with the appropriate shim(-s) ① that has had its respective thickness calculated from information marked on the crankcase and the end of the middle drive gear.

b. To find middle drive gear shim thickness "A", use the following formula.

Middle drive gear shim thickness "A"= ⓐ – ⓒ

ⓐ = "43,00"

ⓑ = a numeral on the upper crankcase near the main bearing selection numbers and which is added to the nominal size "42"

Example:

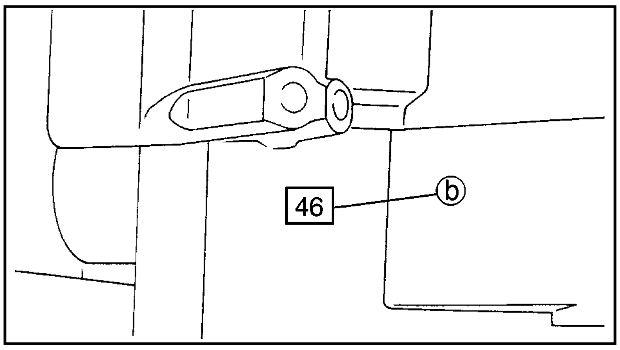
ⓐ is 43.00

If the upper crankcase is marked "46" ⓑ

ⓒ is 42.46 (i.e., 42.00 + 0.46 = 42.46)

"A" = 43.00 – 42.46 = 0.54

Round off to the hundredths digit and select the appropriate shim(-s).



NOTE:

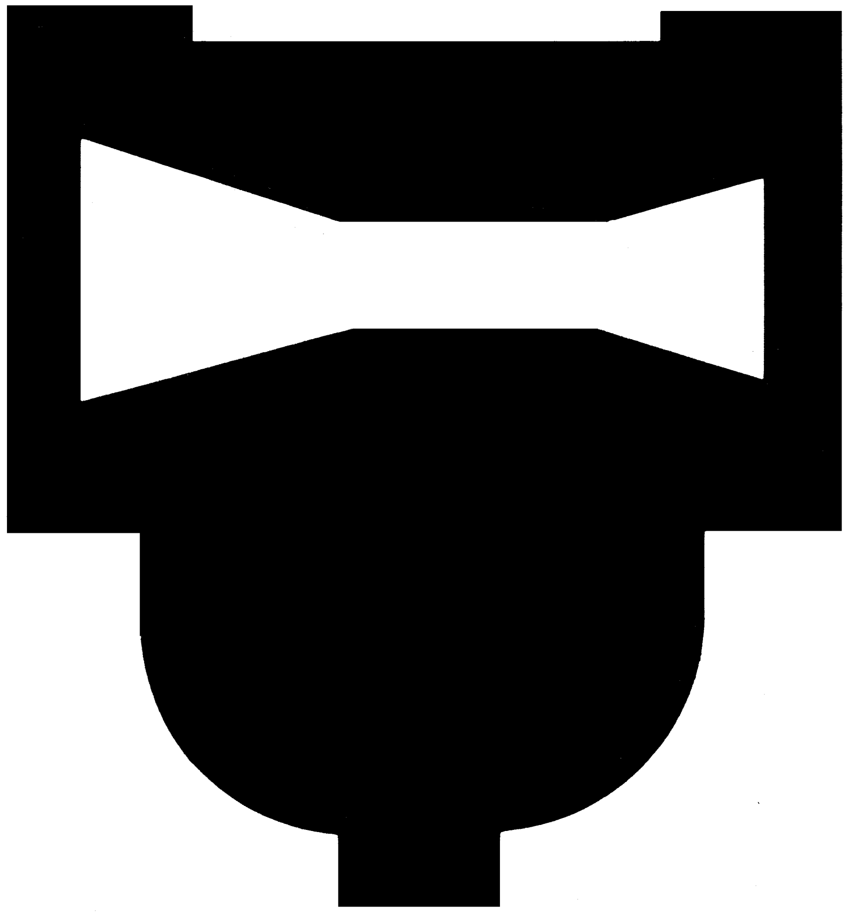
In the above example, the calculated number is 0.54. The chart instructs you to round off the 4 to 5. Thus, the shim thickness is 0.55 mm.

Hundredths	Rounded value
0, 1, 2	0
3, 4, 5, 6	5
7, 8, 9	10

Shims are supplied in the following thickness.

Middle drive pinion gear shim:	
Thickness (mm)	0.10 ; 0.15; 0.20

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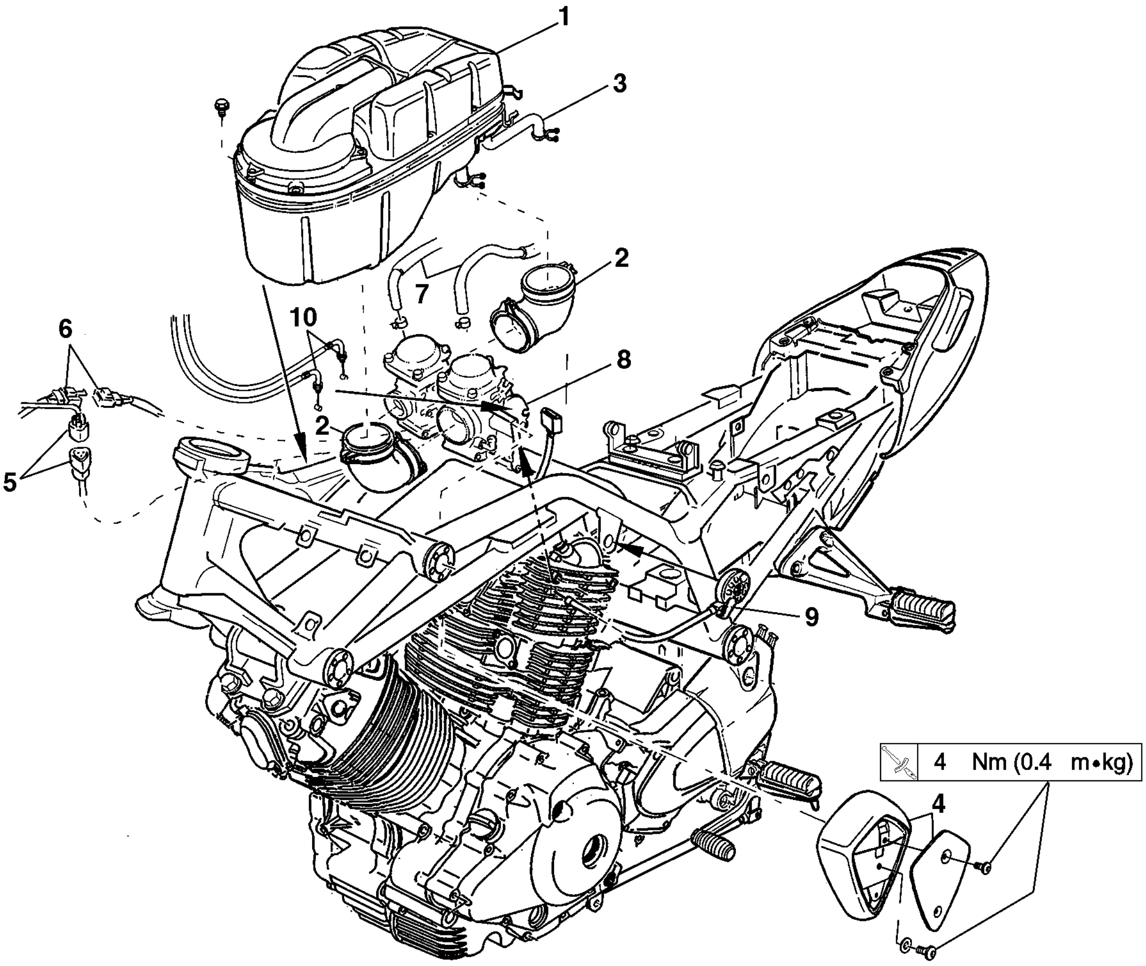


CARB 5

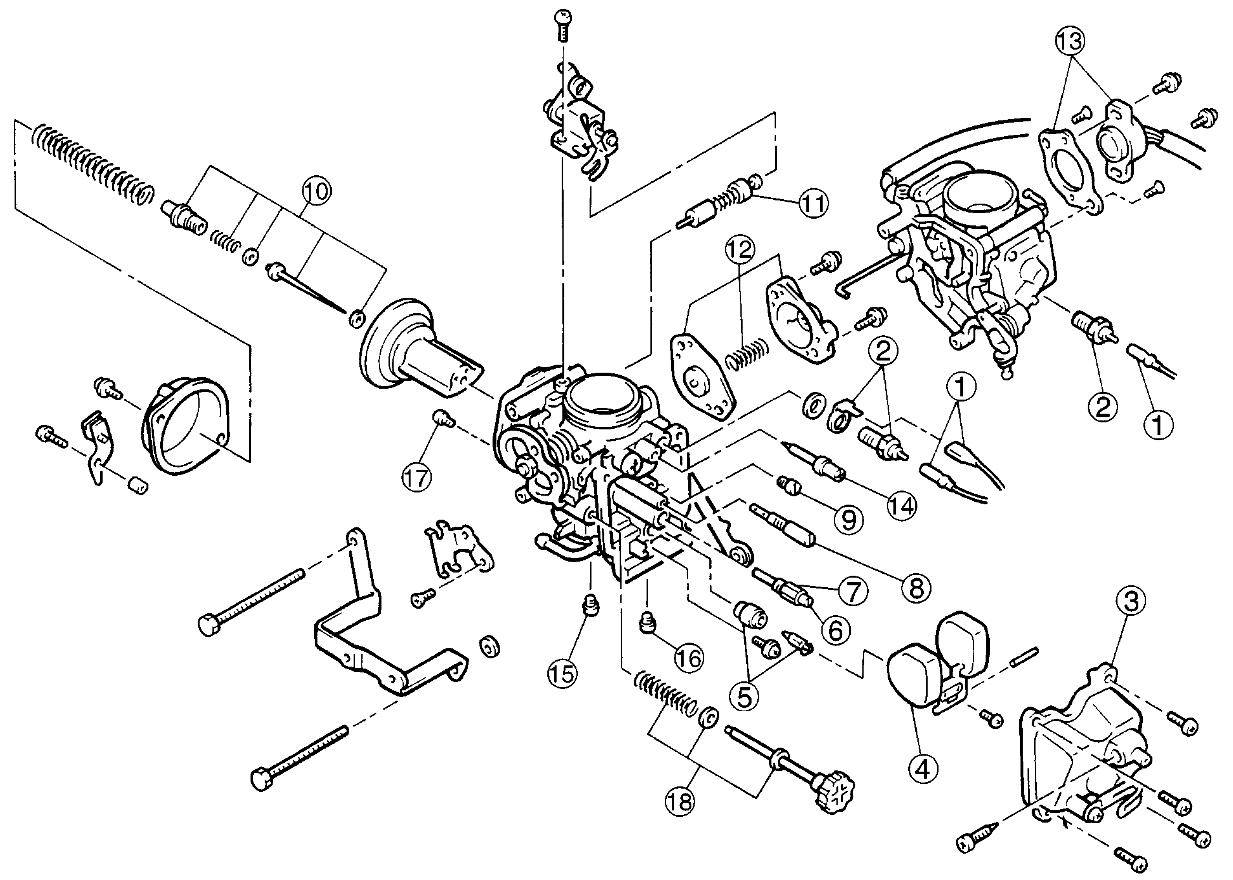
CHAPTER 5.
CARBURETION

CARBURETION

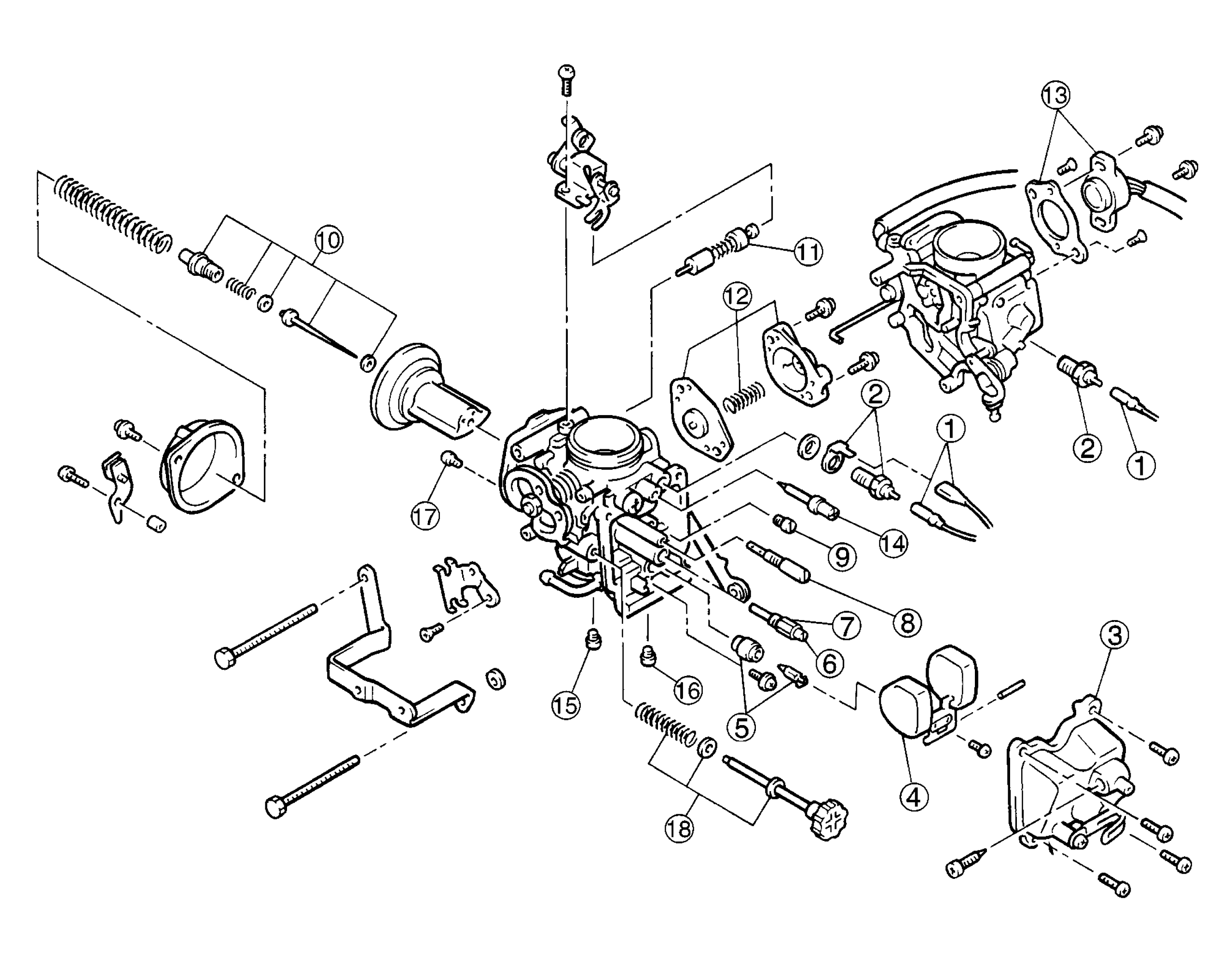
CARBURETOR



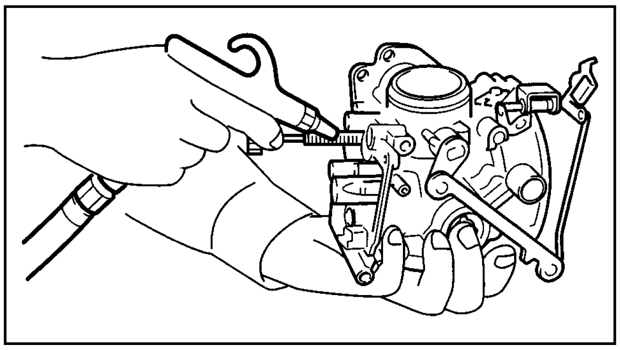
Order	Job name/Part name	Q'ty	Remarks
	Removing the carburetors		Remove the parts in the order listed.
	Seat		Refer to "SEAT, SIDE COVERS AND
	Fuel tank		FUEL TANK" in Chapter 3.
1	Air filter case assembly	1	
2	Air ducts	2	
3	Cylinder head breather hose	1	Disconnect
4	Cover	1	
5	Throttle position sensor lead	1	Disconnect
6	Carburetor heater lead	1	Disconnect
7	Fuel hoses	2	Disconnect
8	Carburetor assembly	1	
9	Starter cable	1	**NOTE:**
10	Throttle cables	2	After removing the carburetor assembly, remove the starter cable and throttle cables.
			For installation, reverse the removal procedure.



Order	Job name/Part name	Q'ty	Remarks
	Disassembling the carburetor		Disassemble the parts in the order listed.
①	Carburetor heater leads	2	
②	Carburetor heaters	2	12V 30W
③	Float chamber/gasket	1	
④	Float	1	
⑤	Needle valve set	1	
⑥	Main jet	1	
⑦	Jet holder	1	
⑧	Pilot jet	1	Refer to "CARBURETOR ASSEMBLY".
⑨	Starter jet	1	
⑩	Jet needle set	1	
⑪	Starter plunger set	1	



Order	Job name/Part name	Q'ty	Remarks
⑫	Diaphragm set	1	Refer to "ASSEMBLING THE CARBURETORS".
⑬	Throttle position sensor	1	Refer to "CHECKING AND ADJUSTING THE THROTTLE POSITION SENSOR (TPS)".
⑭	Pilot screw	1	
⑮	Main air jet	1	
⑯	Pilot air jet 1	1	
⑰	Pilot air jet 2	1	
⑱	Throttle stop screw set	1	
			For assembly, reverse the disassembly procedure.



EB600031

CHECKING THE CARBURETORS

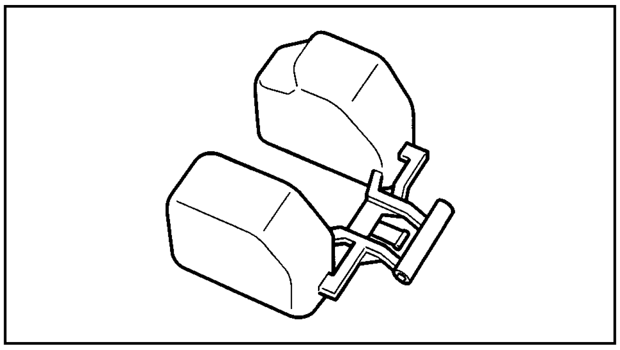
The following procedure applies to all of the carburetors.

1. Check:
   - carburetor body
   - float chamber
   - jet housing
     Cracks/damage → Replace.
2. Check:
   - fuel passages
     Obstruction → Clean.

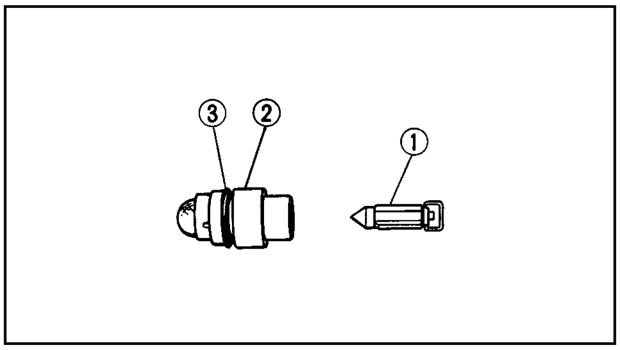
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a. Wash the carburetor in a petroleumbased solvent. Do not use any caustic-carburetor-cleaning solution.
b. Blow out all of the passages and jets with compressed air.

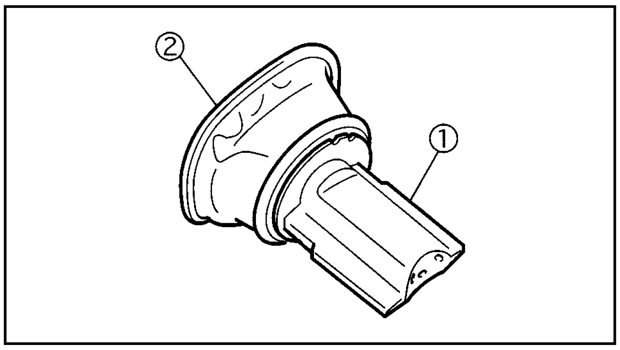
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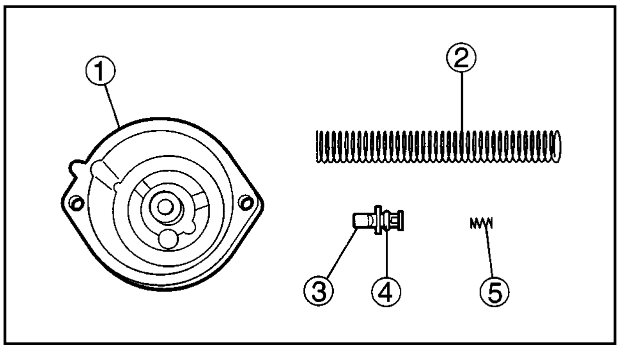
3. Check:
   - float chamber body
     Dirt → Clean.
4. Check:
   - float chamber rubber gasket
     Cracks/damage/wear → Replace.
5. Check:
   - float
     Damage → Replace.



6. Check:
   - needle valve ①
   - needle valve seat ②
   - O-ring ③
     Damage/obstruction/wear → Replace the needle valve, needle valve seat and O-ring as a set.

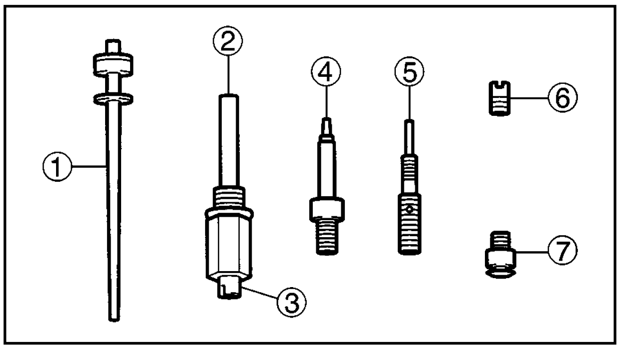


7. Check:
   - piston valve ①
     Damage/scratches/wear → Replace.
   - rubber diaphragm ②
     Cracks/tears → Replace.



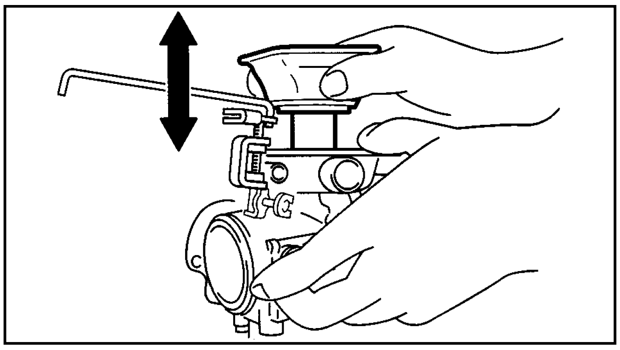
8. Check:
   - vacuum chamber cover ①
   - piston valve spring ②
   - plastic cap ③
   - O-ring ④
   - spring ⑤

   Cracks/damage → Replace.



9. Check:
   - jet needle ①
   - needle jet ②
   - main jet ③
   - pilot screw ④
   - pilot jet ⑤
   - main air jet ⑥
   - starter jet ⑦

   Bends/damage/wear → Replace.
   Obstruction → Clean.
   Blow out the jets with compressed air.



10. Check:
    - piston valve movement

    Insert the piston valve into the carburetor-body and move it up and down.
    Tightness → Replace the piston valve.

11. Check.
    - fuel feed pipes
    - hose joint

    Cracks/damage → Replace.
    Obstruction → Clean.
    Blow out the pipes with compressed air.

12. Check:
    - fuel feed hoses
    - fuel hoses

    Cracks/damage/wear → Replace.
    Obstruction → Clean.
    Blow out the hoses with compressed air.

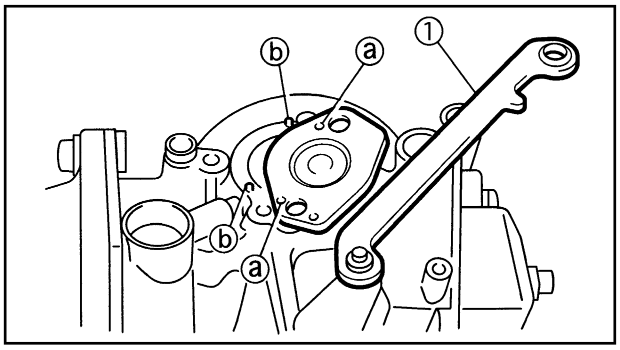
EB600042

ASSEMBLING THE CARBURETORS

The following procedure applies to both of the carburetors.

CAUTION:

- **Before assembling the carburetors, wash all of the parts in a petroleum-based solvent.**
- **Always use a new gasket.**



1. Install:
   - coasting enricher diaphragm
   - coasting enricher spring
   - coasting enricher cover

NOTE:

- Align the holes ⓐ on the coasting enricher diaphragm with the projections ⓑ in the carburetor body.
- When installing the coasting enricher, position the throttle connecting arm ① as shown.

2. Install:
   - connecting bolts

NOTE:

After installing the connecting bolts, check that the throttle cable lever and starter plunger link operate smoothly.

EB600051

INSTALLING THE CARBURETORS

1. Adjust:
   - carburetor synchronization
     Refer to "SYNCHRONIZING THE CARBURETORS" in Chapter 3.
2. Adjust:
   - engine idling speed

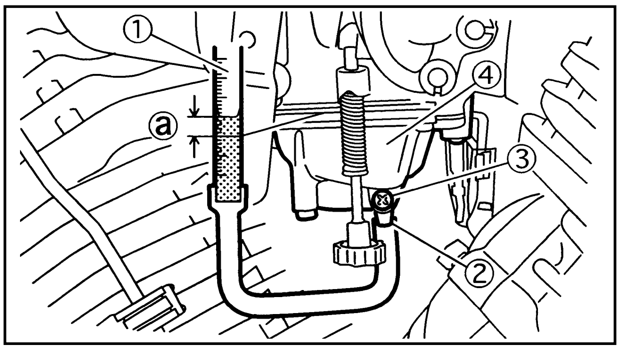
Engine idling speed
950 ~ 1,050 r/min

Refer to "ADJUSTING THE ENGINE IDLING SPEED" in Chapter 3.

3. Adjust:
   - throttle cable free play

Throttle cable free play
(at the flange of the throttle grip)
3 ~ 5 mm

Refer to "ADJUSTING THE THROTTLE CABLE FREE PLAY" in Chapter 3.



EB600063

MEASURING AND ADJUSTING THE FUEL LEVEL

1. Measure:
   - fuel level ⓐ
     Out of specification → Adjust.

Fuel level (above the line on the float chamber) 4 ~ 5 mm

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a. Stand the motorcycle on a level surface.
b. Place the motorcycle on a suitable stand to ensure that the motorcycle is standing straight up.
c. Install the fuel level gauge ① to the fuel drain pipe ②.

Fuel level gauge 90890-01312

d. Loosen the fuel drain screw ③.
e. Hold the fuel level gauge vertically next to the upper face of the float chamber ④.
f. Measure the fuel level ⓐ.

NOTE:
Fuel level readings should be equal on both sides of the carburetor assembly.

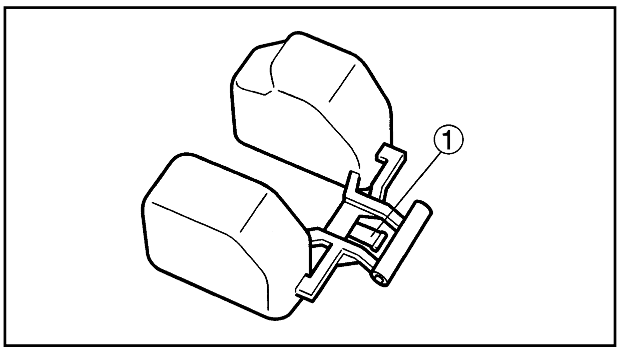
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2. Adjust:
   - fuel level

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a. Remove the carburetor assembly.
b. Check the needle valve seat and needle valve.
c. If either is worn, replace them as a set.
d. If both are fine, adjust the float level by slightly bending the float tang ①.
e. Install the carburetor assembly.
f. Measure the fuel level again.
g. Repeat steps (a) to (f) until the fuel level is within specification.

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EB600071

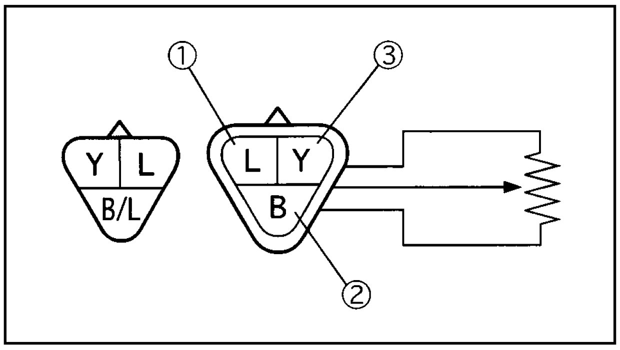
CHECKING AND ADJUSTING THE THROTTLE POSITION SENSOR

NOTE:

Before adjusting the throttle position sensor, the engine idling speed should be properly adjusted.

1. Inspect:
   - throttle position sensor

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a. Disconnect the throttle position sensor coupler.
b. Connect the pocket tester (Ω × 1k) to the throttle position sensor.

Tester positive lead → blue ①
Tester negative lead → black ②

c. Check the throttle position sensor resistance "R1".
   Out of specification → Replace the throttle position sensor.

Throttle position sensor resistance "R1" **4 ~ 6 kΩ at 20 °C (68 °F)** **(blue – black)**

d. Connect the pocket tester (Ω × 1k) to the throttle position sensor.

Tester positive lead → yellow ③
Tester negative lead → black ②

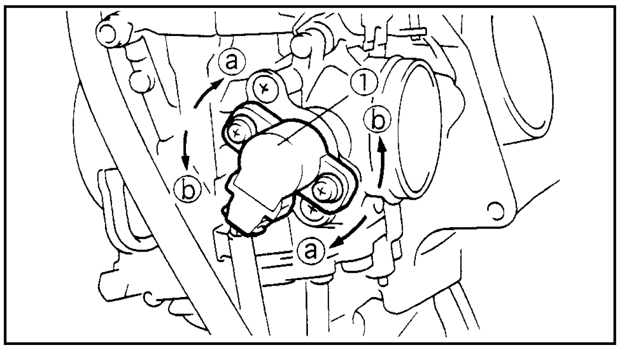
e. While slowly opening the throttle, check that the throttle position sensor resistance "R2" is within the specified range.
   Out of specification → Replace the throttle position sensor.

Throttle position sensor resistance "R2" **0.56 ~ 0.84 kΩ to 3.01 ~ 4.51 kΩ at 20 °C (68 °F)** **(yellow – black)**

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2. Adjust:
   - throttle position sensor angle

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a. Loosen the throttle position sensor screws ①.
b. Turn the throttle position sensor in direction ⓐ or ⓑ until the specified closed-throttle resistance is indicated on the pocket tester.

Closed-throttle resistance
0.56 ~ 0.84 kΩ at 20 °C (68 °F)
(yellow – black)

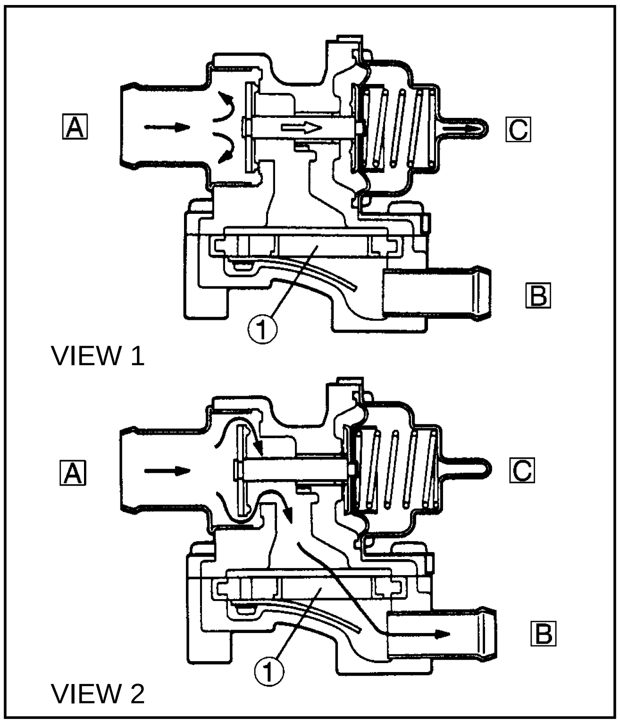
c. Tighten the throttle position sensor screws.

NOTE:

Remove the pocket tester leads and connect the throttle position sensor coupler.

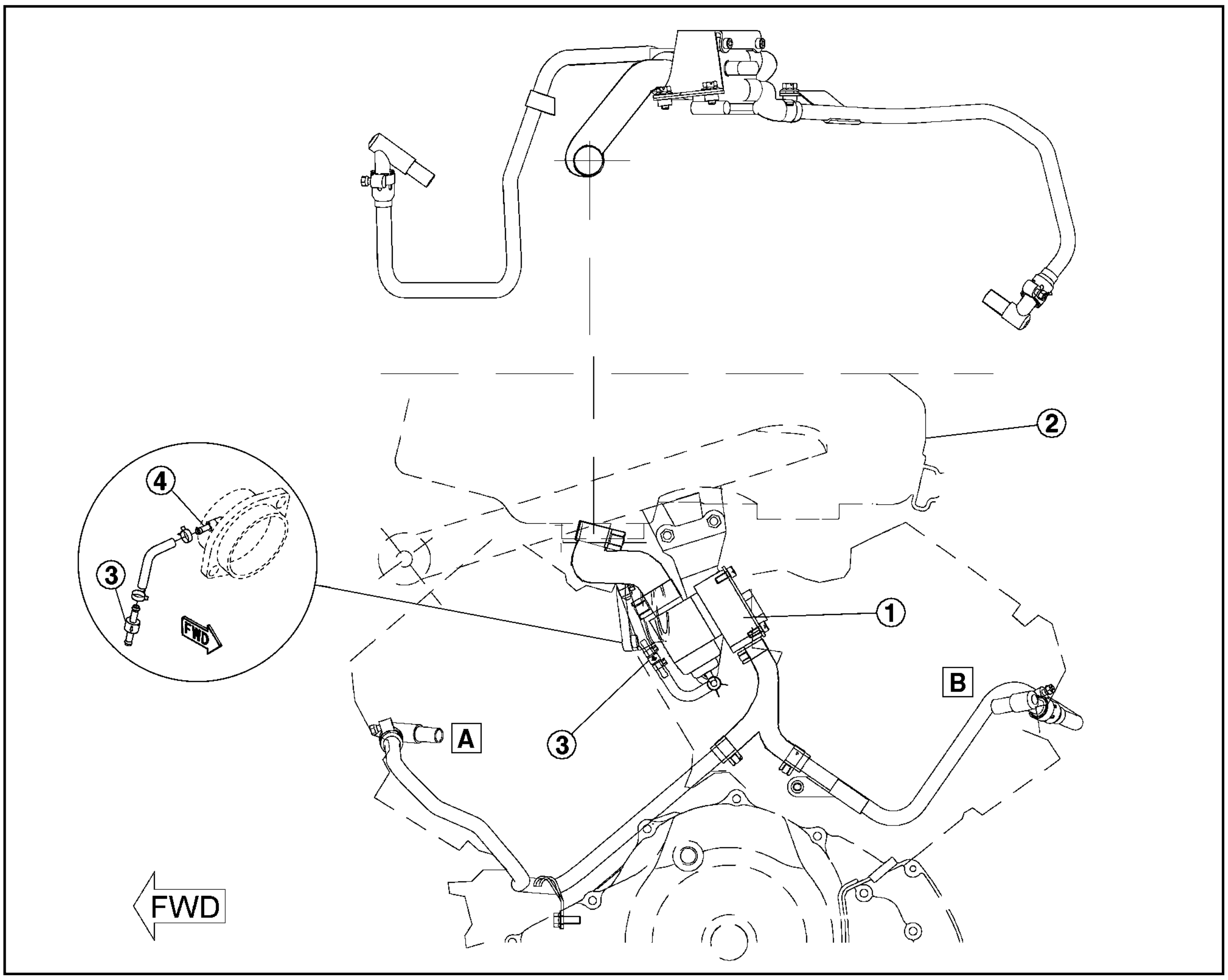
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EB601000
AIR INDUCTION SYSTEM (AIS)
AIR INDUTION
This system burns the unburned exhaust gases by injecting fresh air (secondary air) at the exhaust port. This is to reduce the output of the hydrocarbons.
When there is negative pressure around the exhaust port, the reed valve opens and the secondary air flows into the exhaust port.
The required temperature for burning the unburned exhaust gases is approximately 600 to 700 °C.



AIR CUT-OFF VALVE
The air cut-off valve is operated by intake gas pressure through the diaphragm. Normally, this valve is opened in order to allow fresh air to flow into the exhaust port.
When the throttle is rapidly closed, negative pressure is generated and the valve closes in order to prevent after-burning.
VIEW 1. (NO FLOW)
When decelerating (the throttle closes), the valve will close.
VIEW 2. (FLOW)
During normal operation the valve is open.

[A] From the air filter
[B] To the cylinder heads
[C] To the carburetor joint
① Reed valve



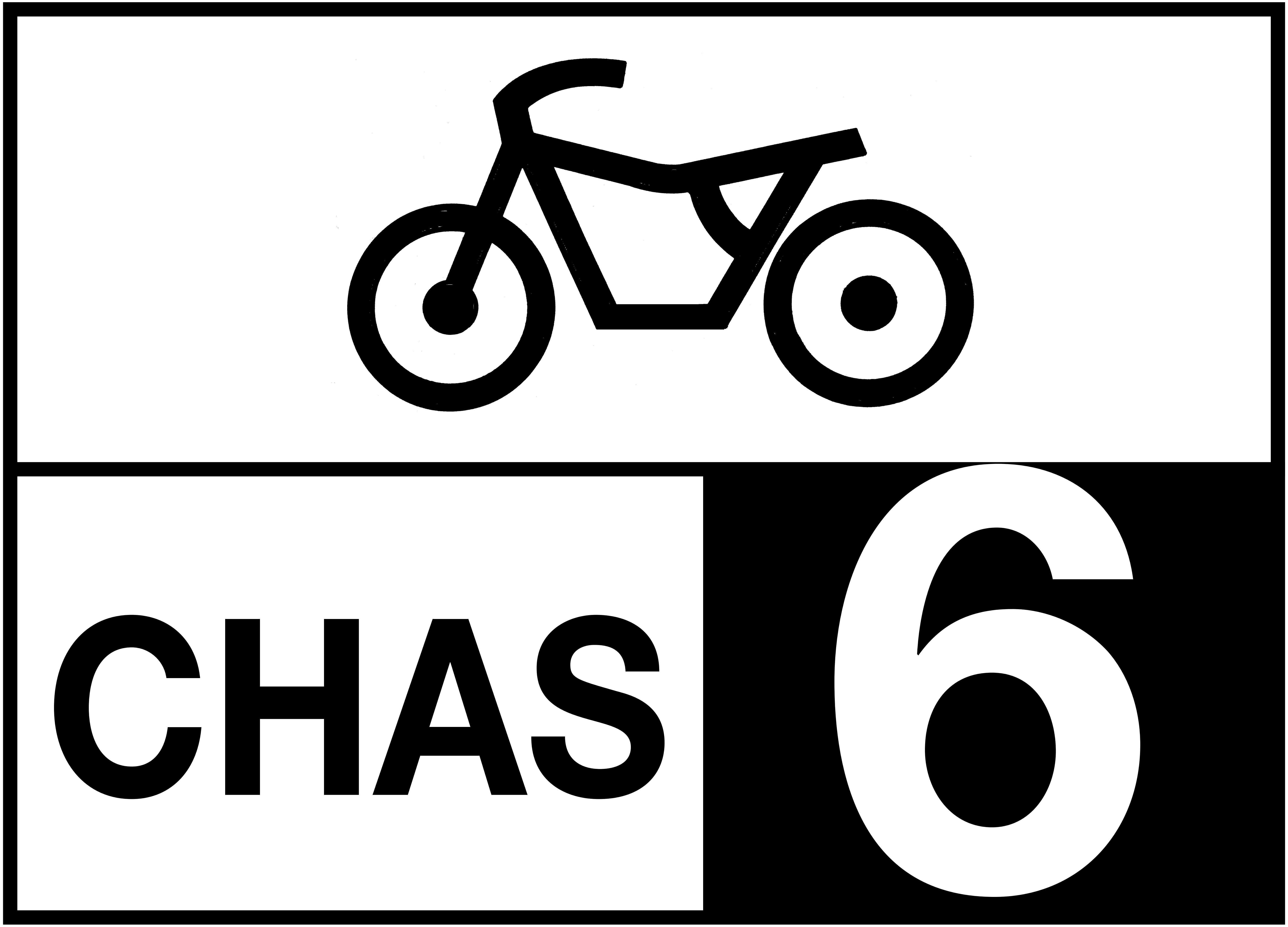
① Reed valve
② Air filter
③ Orifice
④ Carburetor joint (near cylinder)
[A] To the front cylinder head
[B] To the rear cylinder head

AIR INDUCTION SYSTEM INSPECTION

1. Inspect:
   - hose connections
     Poor connections → Properly connect.
   - hoses
   - reed valves
   - air cut-off valve
   - air filter
     Cracks/damage → Replace.
     Clogged → Clean.

NOTE:

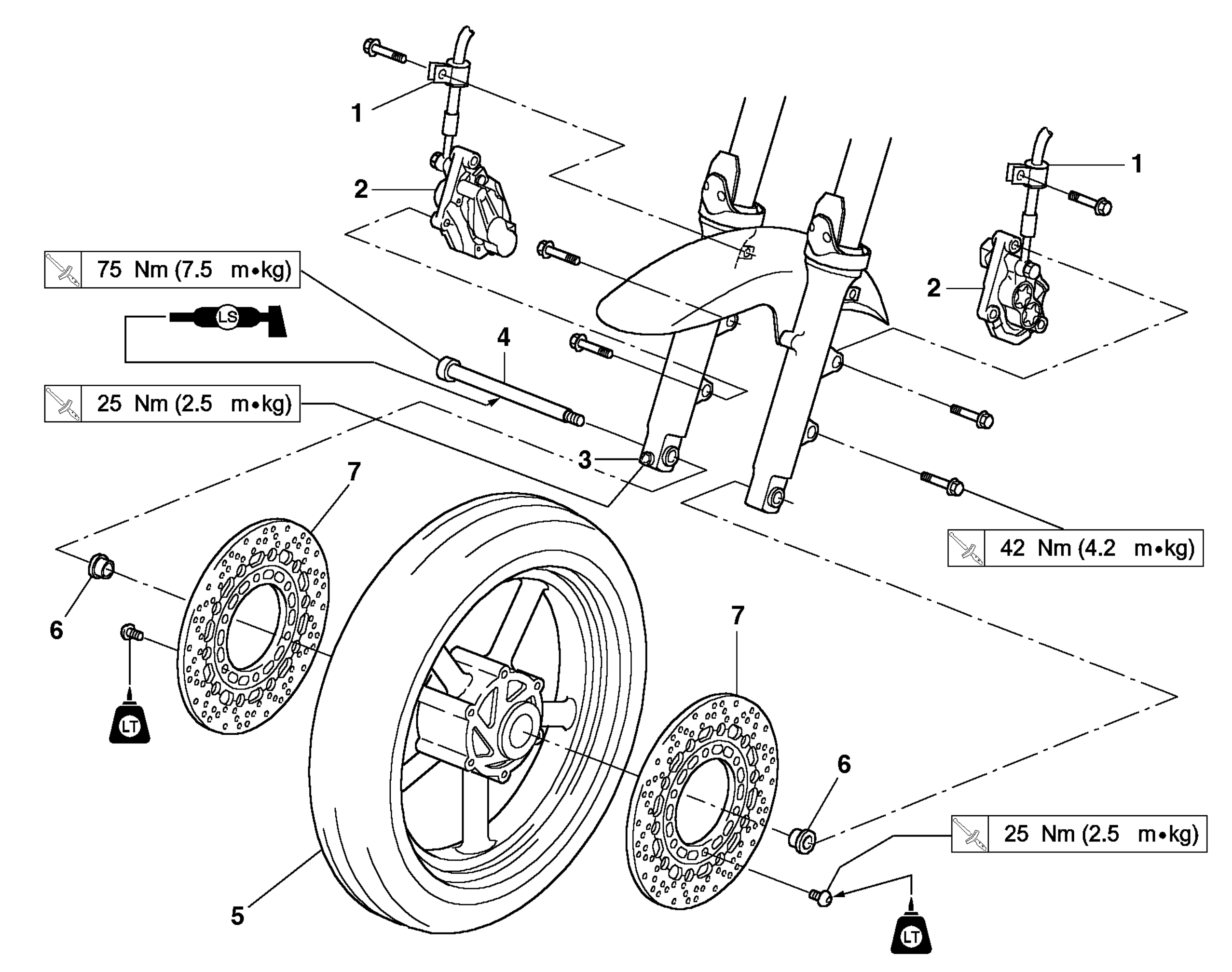
The orifice ③ should be installed with the arrow mark facing the AIS valve side.


CHAS
6

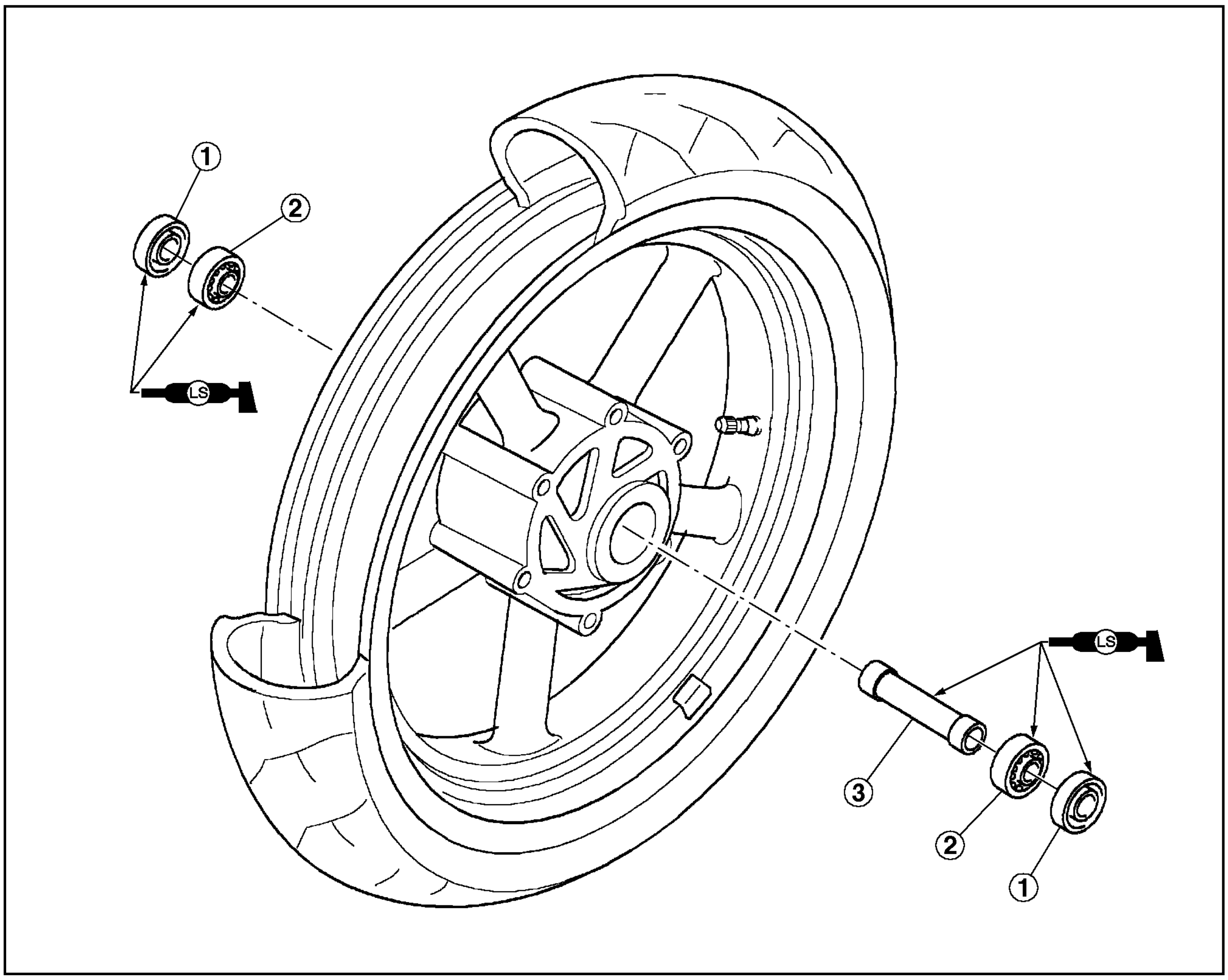
CHAPTER 6.
CHASSIS

CHASSIS

FRONT WHEEL AND BRAKE DISCS



Order	Job name/Part name	Q'ty	Remarks
	Removing the front wheel and brake discs		Remove the parts in the order listed.
			WARNING
			For installation, reverse the removal procedure.
1	Brake hose holder (right/left)	1/1	Refer to "REMOVING/INSTALLING THE FRONT WHEEL".
2	Brake caliper (right/left)	1/1	
3	Front wheel axle pinch bolt	1	
4	Front wheel axle	1	
5	Front wheel assembly	1	
6	Collars	2	Refer to "INSTALLING THE FRONT WHEEL".
7	Brake disc (right/left)	1/1	
			Securely support the motorcycle so there is no danger of it falling over.



Order	Job name/Part name	Q'ty	Remarks
	Disassembling the front wheel		Disassemble the parts in the order listed.
①	Oil seals	2	
②	Bearings	2	
③	Collar	1	
			For assembly, reverse the disassembly procedure.

EASB0015

REMOVING THE FRONT WHEEL

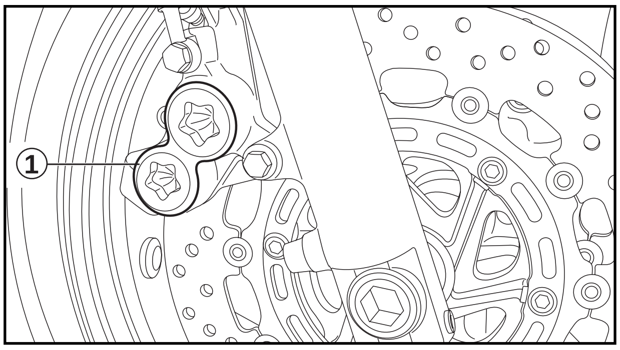
1. Stand the motorcycle on a level surface.

⚠ WARNING

Securely support the motorcycle so that there is no danger of it falling over.

NOTE:

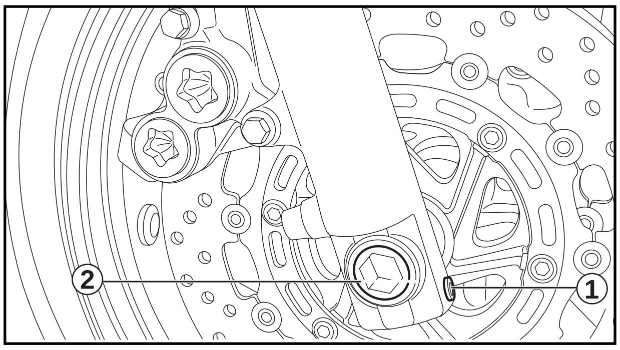
Place the motorcycle on a suitable stand so that the front wheel is elevated.



2. Remove:
   - brake hose holder (right/left)
   - brake calipers ① (left and right)

NOTE:

Do not squeeze the brake lever when removing the brake calipers.



3. Loosen:
   - pinch bolt (front wheel axle) ①
4. Remove:
   - front wheel axle ②
5. Remove:
   - front wheel

EAS00525

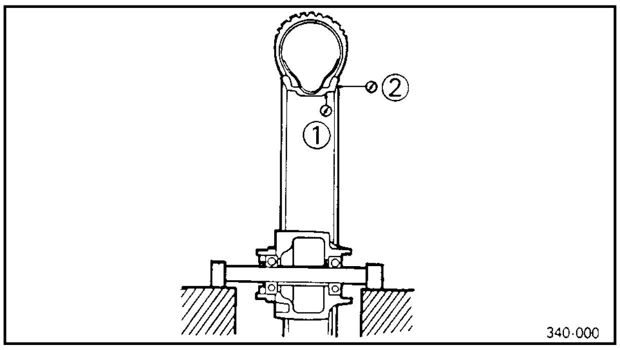
CHECKING THE FRONT WHEEL

1. Check:
   - wheel axle
     Roll the wheel axle on a flat surface.
     Bends → Replace.

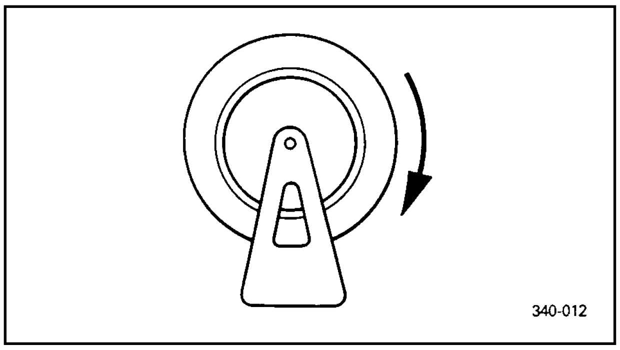
⚠ WARNING

Do not attempt to straighten a bent wheel axle.

2. Check:
   - tire
   - front wheel
     Damage/wear → Replace.
     Refer to "CHECKING THE TIRES" and "CHECKING THE WHEELS" in Chapter 3.



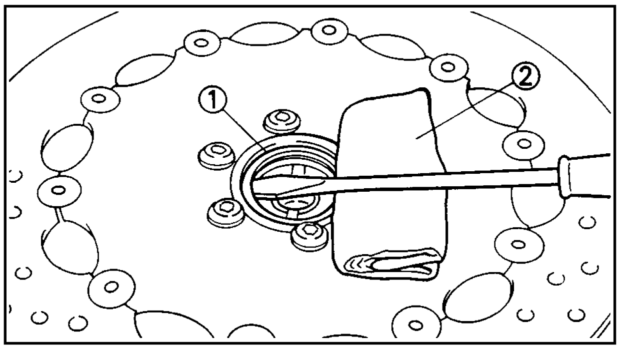
3. Measure:
   - front wheel radial runout ①
   - front wheel lateral runout ②
     Over the specified limits → Replace.



Front wheel radial runout limit
1.0 mm
Front wheel lateral runout limit
0.5 mm

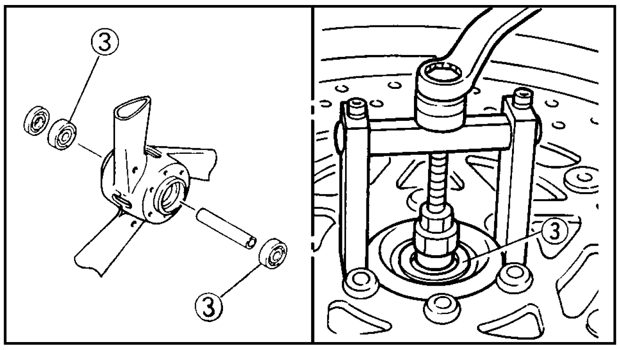
4. Check:
   - wheel bearings
     Front wheel turns roughly or is loose → Replace the wheel bearings.
   - oil seals
     Damage/wear → Replace.
5. Replace:
   - wheel bearings (New)
   - oil seals (New)

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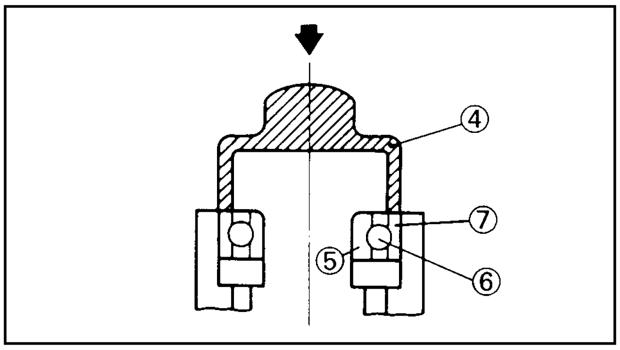


a. Clean the outside of the front wheel hub.
b. Remove the oil seals ① with a flat-head screwdriver.

NOTE:
To prevent damaging the wheel, place a rag ② between the screwdriver and the wheel surface.



c. Remove the wheel bearings ③ with a general bearing puller.
d. Install the new wheel bearings and oil seals in the reverse order of disassembly.



CAUTION:

Do not contact the wheel bearing center race ⑤ or balls ⑥. Contact should be made only with the outer race ⑦.

NOTE:
Use a socket ④ that matches the diameter of the wheel bearing outer race and oil seal.

EAS00531

CHECKING THE BRAKE DISCS

The following procedure applies to all of the brake discs.

1. Check:
   - brake disc
     Damage/galling → Replace.
2. Measure:
   - brake disc deflection
     Out of specification → Correct the brake disc deflection or replace the brake disc.

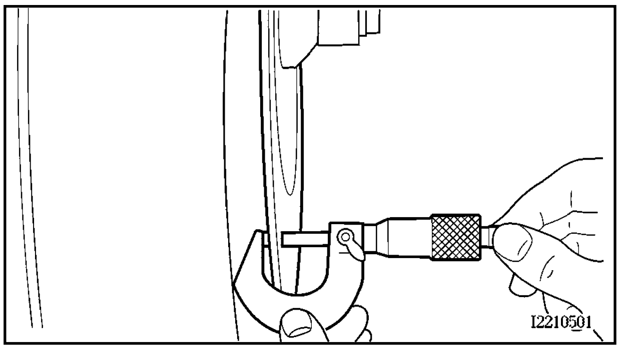
Brake disc deflection limit
Front: 0.2 mm
Rear: 0.15 mm

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a. Place the motorcycle on a suitable stand so that the wheel is elevated
b. Before measuring the front brake disc deflection, turn the handlebar to the left or right to ensure that the front wheel is stationary.
c. Remove the brake caliper.
d. Hold the dial gauge at a right angle against the brake disc surface.
e. Measure the deflection 2 ~ 3 mm below the edge of the brake disc.

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3. Measure:
   - brake disc thickness
     Measure the brake disc thickness at a few different locations.
     Out of specification → Replace.



Brake disc thickness limit (minimum)
Front: 4.5 mm
Rear: 4.5 mm

4. Adjust:
   - brake disc deflection

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a. Remove the brake disc.
b. Rotate the brake disc by one bolt hole.
c. Install the brake disc.

NOTE:
Tighten the brake disc bolts in stages and in a crisscross pattern.

Brake disc bolt
25 Nm (2.5 m•kg)
LOCTITE®

d. Measure the brake disc deflection.
e. If out of specification, repeat the adjustment steps until the brake disc deflection is within specification.
f. If the brake disc deflection cannot be brought within specification, replace the brake disc.

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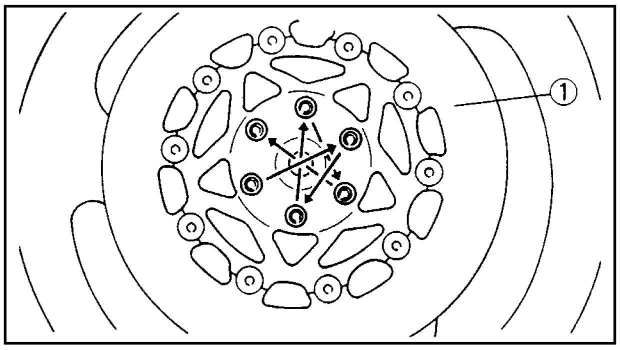
EASB0016

INSTALLING THE FRONT WHEEL

The following procedure applies to both brake discs.

1. Lubricate:
   - wheel axle
   - oil seallips

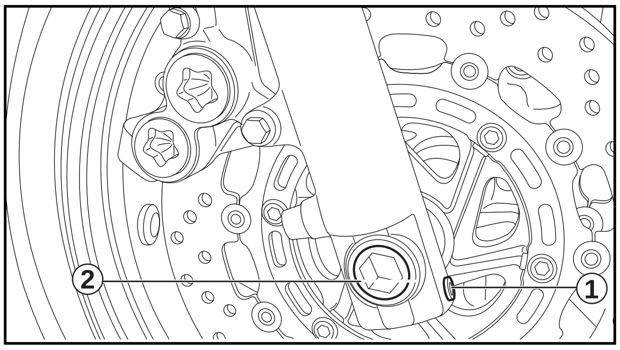
	Recommended lubricant **Lithium soap base grease**



2. Install:
   - front brake disc ①

NOTE:
- Apply LOCTITE® 648 to the thread of the bolts.
- Tighten the brake disc bolts in stages and in a crisscross pattern

	Brake disc bolt **25 Nm (2.5 m•kg)** **LOCTITE® 648**



3. Install:
   - front wheel assembly
4. Tighten:
   - wheel axle ②
   - wheel axle pinch bolt ①

	Wheel axle **75 Nm (7.5 m•kg)** **Wheel axle pinch bolt** **25 Nm (2.5 m•kg)**

CAUTION:

Before tightening the wheel axle pinch bolt, push down hard on the handlebar several times and check if the front fork rebounds smoothly.

5. Install:
   - brake calipers (right/left)

	Brake caliper bolt **42 Nm (4.2 m•kg)**

⚠ WARNING

Make sure that the brake hose is routed properly.

EAS00549

ADJUSTING THE FRONT WHEEL STATIC BALANCE

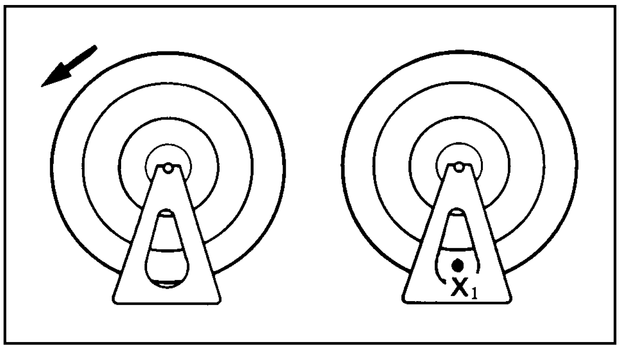
NOTE:
- After replacing the tire, wheel or both, the front wheel static balance shourd be adjusted.
- Adjust the front wheel static balance with the brake discs installed.

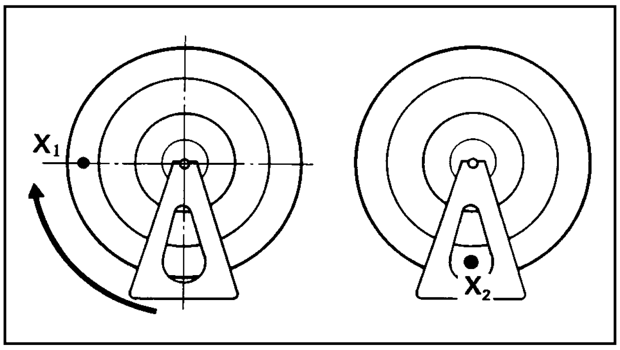
1. Remove:
   - balancing weight (-s)

NOTE:
Place the front wheel on a suitable balancing stand.

2. Find:
   - front wheel's heavy spot

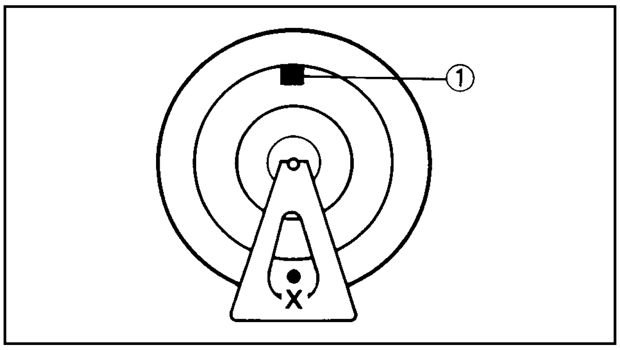
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a. Spin the front wheel.
b. When the front wheel stops, put an "X_1" mark at the bottom of the wheel.
c. Turn the front wheel 90° so that the "X_1" mark is positioned as shown.
d. Release the front wheel.
e. When the wheel stops, put an "X_2" mark at the bottom of the wheel.
f. Repeat steps (b) through (d) several times until all the marks come to rest at the same spot.
g. The spot where all the marks come to rest is the front wheel's heavy spot "X".

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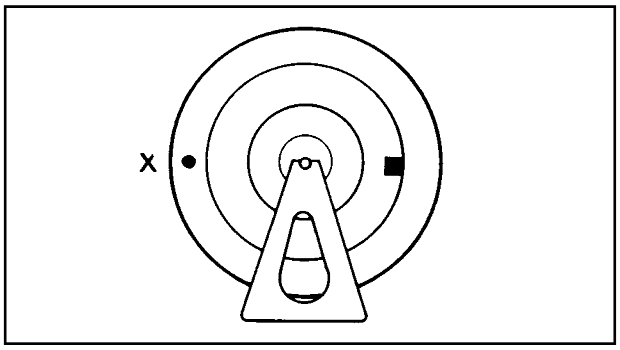


3. Adjust:
   - front wheel static balance

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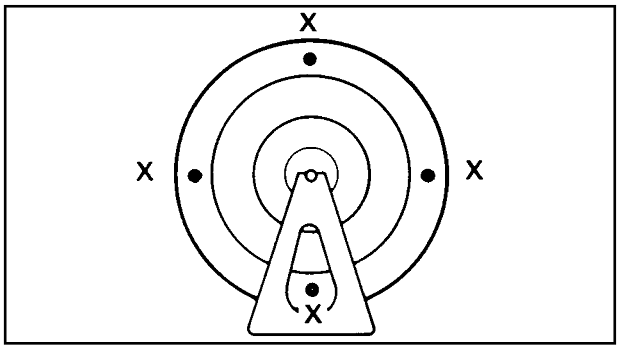
a. Install a balancing weight ① onto the rimexactly opposite the heavy spot "X".

NOTE:
Start with the lightest weight.



b. Turn the front wheel 90° so that the heavy spot is positioned as shown
c. If the heavy spot does not stay in that position, install a heavier weight.
d. Repeat steps (b) and (c) until the front wheel is balanced.

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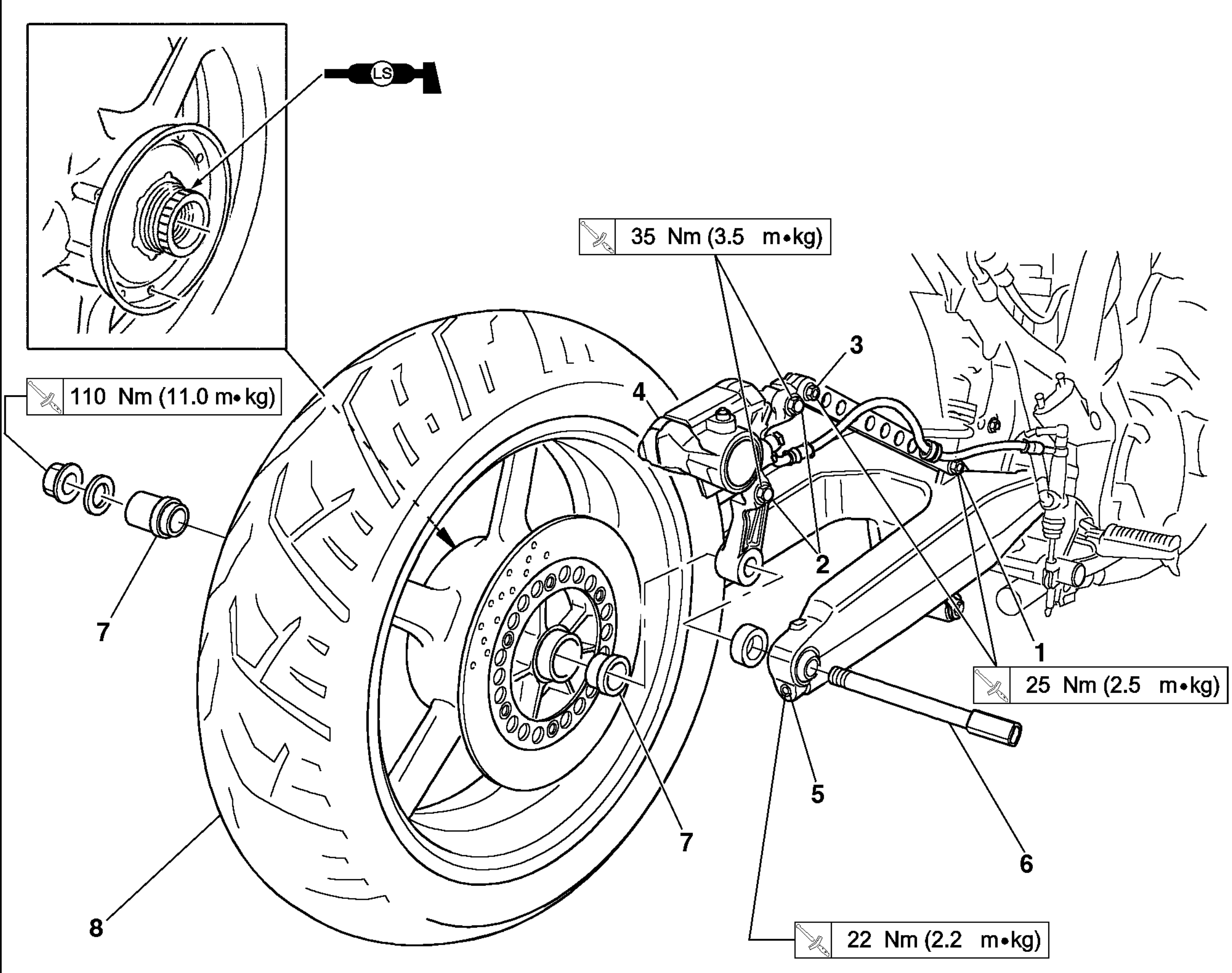
4. Check:
   • front wheel static balance

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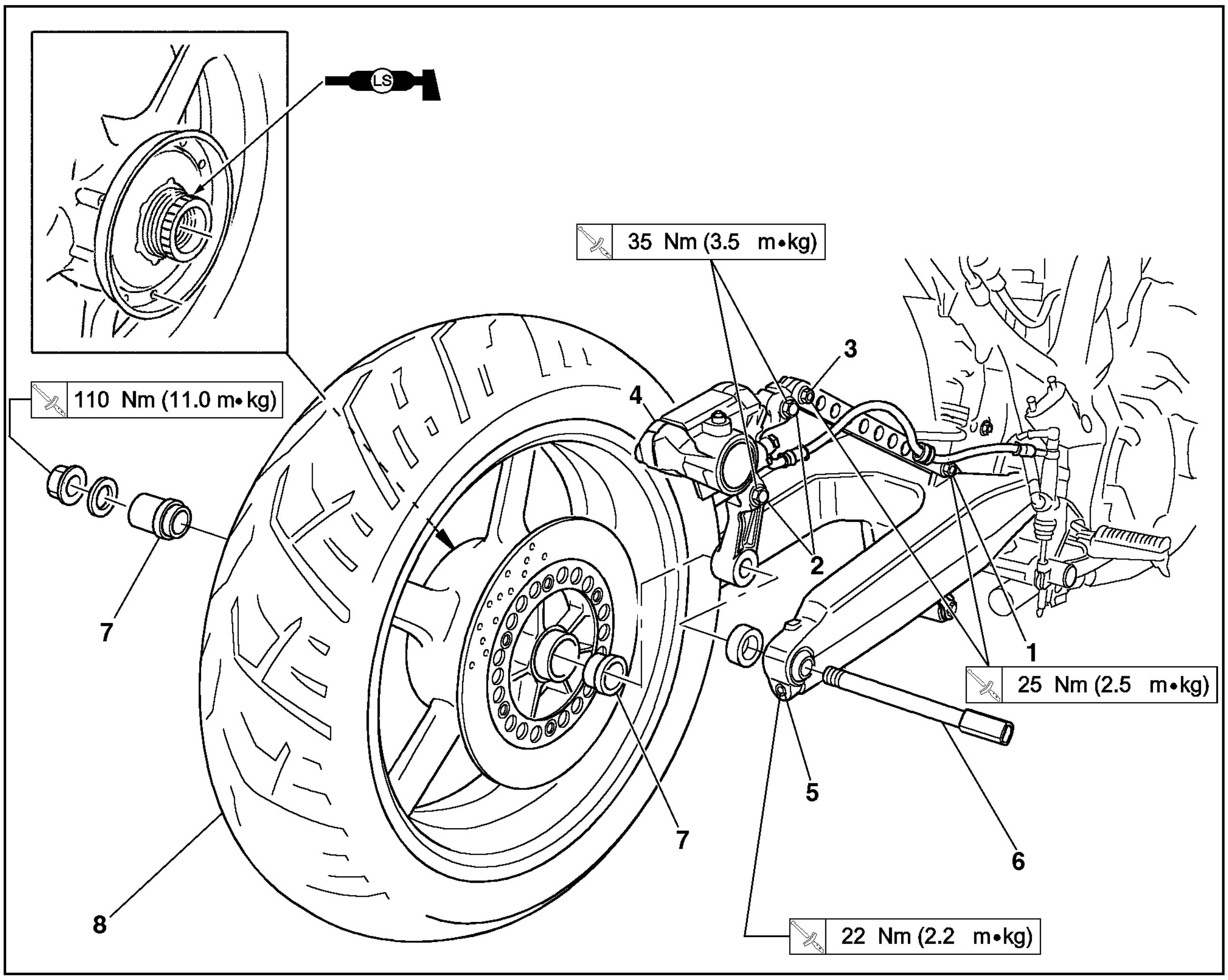
a. Turn the front wheel and make sure that it stays at each position shown.
b. If the front wheel does not remain stationary at all of the positions, rebalance it.

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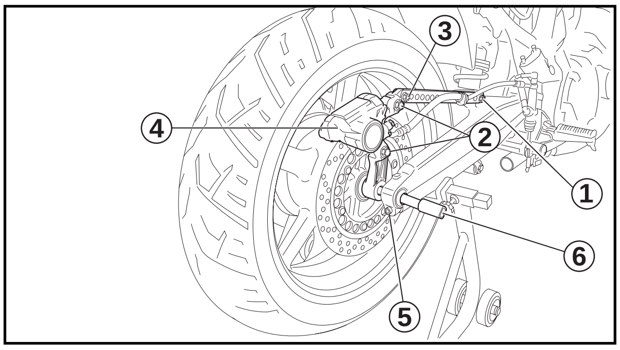
REAR WHEEL AND BRAKE DISC
REAR WHEEL



Order	Job name/Part name	Q'ty	Remarks
	Removing the rear wheel and brake disc		Remove the parts in the order listed. Stand the motorcycle on a level surface. **WARNING** **Securely support the motorcycle so there is no danger of it falling over.**
1	Brake caliper tension bar front bolt	1	Loosen
2	Brake caliper bolt	2	
3	Brake caliper tension bar rear bolt	1	
4	Rear brake caliper	1	
5	Rear wheel axle pinch bolt	1	Loosen
6	Rear wheel axle	1	
7	Collars	2	
8	Rear wheel assembly	1	Refer to "REMOVING/INSTALLING THE REAR WHEEL". For installation, reverse the removal procedure.



Order	Job name/Part name	Q'ty	Remarks
	Disassembling the rear wheel		Remove the parts in the order listed.
①	Brake disc	1	
②	Oil seal	1	
③	Bearing	1	
④	Spacer	1	
⑤	Plate cover	1	
⑥	Hub clutch	1	
⑦	Bearings	2	
⑧	Damper	6	
⑨	Bearing	1	
⑩	Collar	1	
			For assembly, reverse the disassembly procedure.



EASB0017

REMOVING THE REAR WHEEL

1. Stand the motorcycle on a level surface.

⚠ WARNING

Securely support the motorcycle so that there is no danger of it falling over.

NOTE:

Place the motorcycle on a suitable stand so that the rear wheel is elevated.

2. Loosen:
   - brake caliper tension bar front bolt ①
3. Remove:
   - brake caliper bolts ②
   - brake caliper tension bar rear bolt ③
   - rear brake caliper ④
4. Lift:
   - brake caliper tension bar

NOTE:

Do not depress the brake pedal when removing the brake caliper.

5. Loosen:
   - rear wheel axle pinch bolt ⑤
6. Remove:
   - rear wheel axle ⑥
7. Remove:
   - collar
   - spacer
   - rear wheel assembly

EASB0018

CHECKING THE REAR WHEEL

1. Check:
   - rear wheel axle
   - rear wheel
   - wheel bearings
   - oil seals

     Refer to “FRONT WHEEL AND BRAKE DISCS”.
2. Check:
   - tire

     Damage/wear → Replace.

     Refer to “CHECKING THE WHEELS” in Chapter 3.
3. Measure:
   - rear wheel radial runout
   - rear wheel lateral runout

     Refer to “FRONT WHEEL AND BRAKE DISCS”.

EAS00567

CHECKING THE REAR WHEEL DRIVE HUB

1. Check:
   - rear wheel drive hub

     Cracks/damage → Replace.
   - rear wheel drive hub dampers

     Damage/wear → Replace.

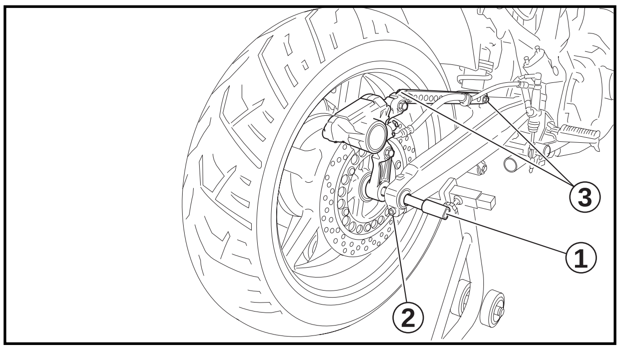
EASB0019

INSTALLING THE REAR WHEEL

1. Lubricate:
   - drive shaft splines
   - wheel axle
   - wheel bearings
   - oil seal lips

	Recommended lubricant **Lithium soap base grease**

2. Install:
   - rear wheel assembly



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a. Install the rear wheel in the swingarm
b. Install the spacers, brake caliper bracket and rear wheel axle ①.
c. Tighten the rear wheel axle nut with specified torque.

	Rear wheel axle **110 Nm (11.0 m•kg)**

d. Tighten the rear axle pinch bolt ② with specified torque.

	Wheel axle pinch bolt **22 Nm (2.2 m•kg)**

e. Install the rear brake caliper and tighten the bolts with specified torque.

	Rear brake caliper bolt **35 Nm (3.5 m•kg)**

f. Push down the brake caliper tension bar.
g. Tighten the bolts ③ of rear brake caliper tension bar with specified torque.

	Rear brake caliper tension bar bolt **25 Nm (2.5 m•kg)**

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EAS00575

ADJUSTING THE REAR WHEEL STATIC BALANCE

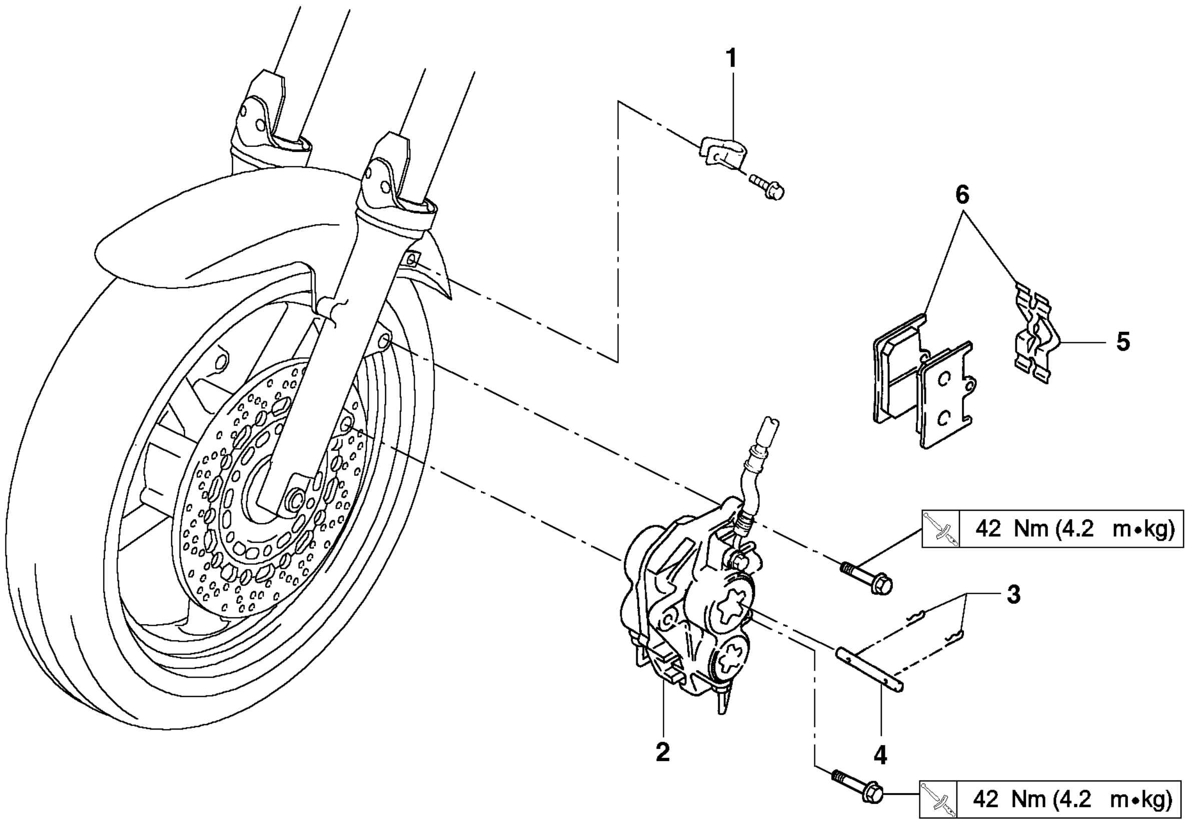
NOTE:

- After replacing the tire, wheel or both, the rear wheel static balance should be adjusted.
- Adjust the rear wheel static balance with the brake disc and rear wheel drive hub installed.

1. Adjust:
   - rear wheel static balance
     Refer to "FRONT WHEEL AND BRAKE DISCS".

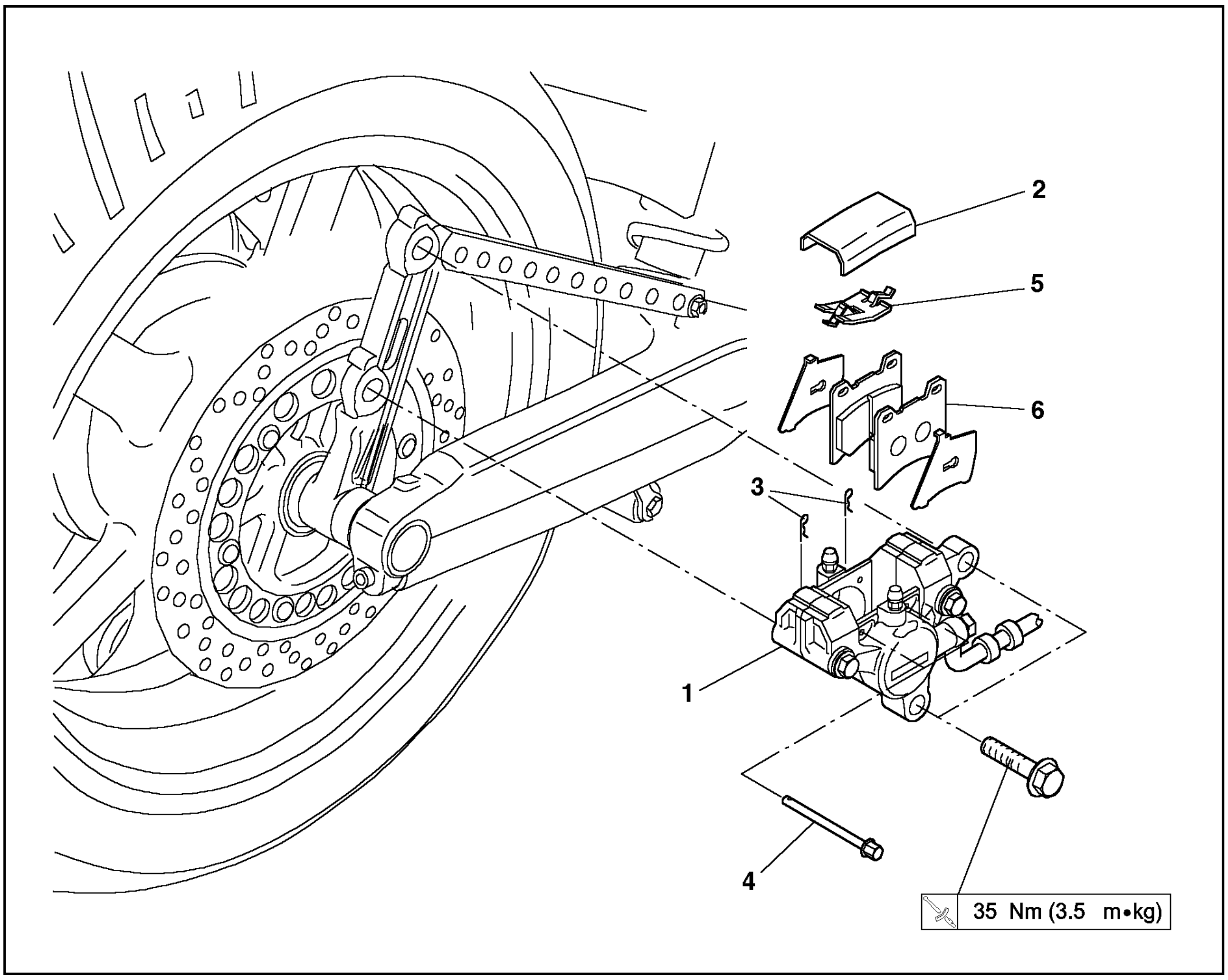
FRONT AND REAR BRAKES

FRONT BRAKE PADS



Order	Job name/Part name	Q'ty	Remarks
	Removing the front brake pads		Remove the parts in the order listed.
1	Brake hose retainer	1	
2	Brake caliper	1	
3	Pad pin clip	2	Refer to "REPLACING THE FRONT BRAKE PADS".
4	Pad pin	1	
5	Pad spring	1	
6	Brake pads	2	
			For installation, reverse the removal procedure.

REAR BRAKE PADS



Order	Job name/Part name	Q'ty	Remarks
	Removing the rear brake pads		Remove the parts in the order listed.
1	Caliper	1	Refer to "REPLACING THE REAR BRAKE PADS".
2	Cover	1	
3	Pad pin clip	2	
4	Pad pin	2	
5	Pad spring	1	
6	Brake pads/shim	2/2	
			For installation, reverse the removal procedure.

EB702100

CAUTION:

Disc brake components rarely require disassembly.
Therefore, always follow these preventive measures:
- **Never disassemble brake components unless absolutely necessary.**
- **If any connection on the hydraulic brake system is disconnected, the entire brake system must be disassembled, drained, cleaned, properly filled, and bled after reassembly.**
- **Never use solvents on internal brake components.**
- **Use only clean or new brake fluid for cleaning brake components.**
- **Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any spilt fluid immediately.**
- **Avoid brake fluid coming into contact with the eyes as it can cause serious injury.**

First aid for brake fluid entering the eyes:
- **Flush with water for 15 minutes and get immediate medical attention.**

EASB0020

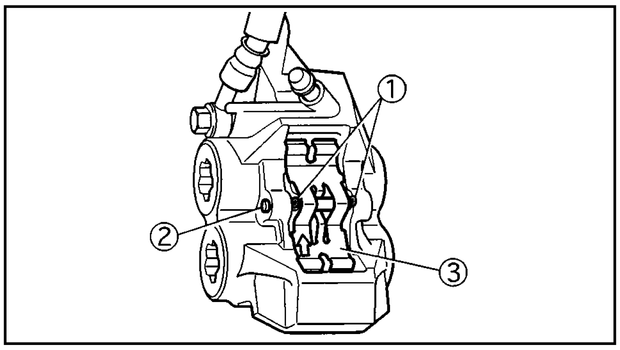
REPLACING THE FRONT BRAKE PADS

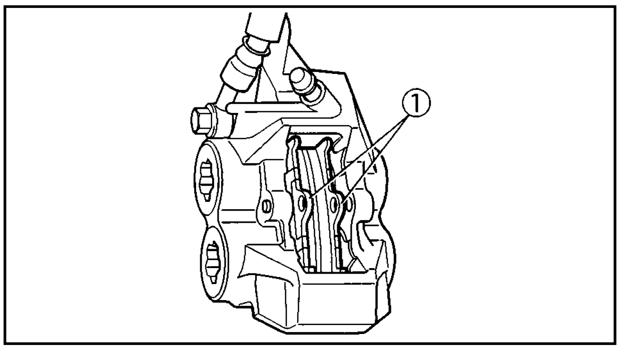
The following procedure applies to both brake calipers.

NOTE:

When replacing the brake pads, it is not necessary to disconnect the brake hose or disassemble the brake caliper.

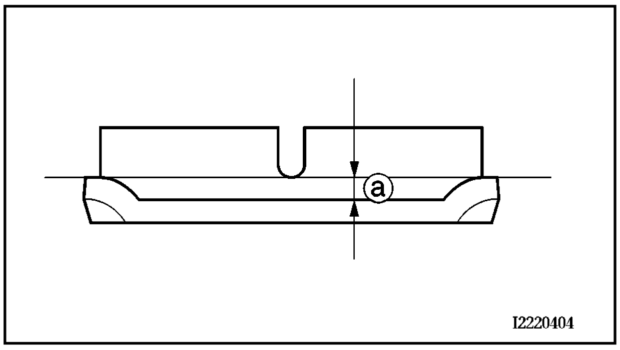
1. Remove:
   - brake hose holder
   - brake caliper
2. Remove:
   - pad pin clip ①
   - pad pin ②
   - pad spring ③





3. Remove:
   - brake pads ①
     (along with the brake pad shims)
4. Measure:
   - brake pad wear limit ⓐ
     Out of specification → Replace the brake pads as a set.

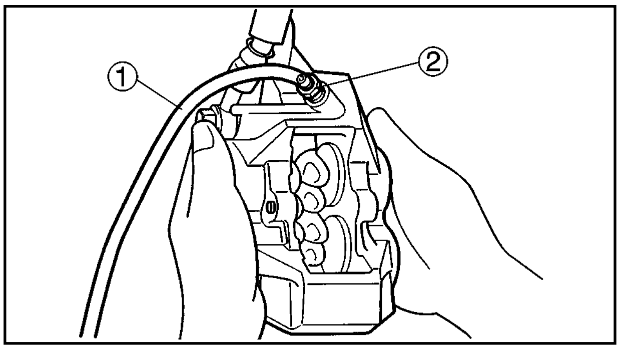
Brake pad wear limit
0.5 mm



5. Install:
   - brake pad shims
     (onto the brake pads)
   - brake pads
   - brake pad spring

NOTE:
Always install new brake pads, brake pad shims, and a brake pad spring as a set.

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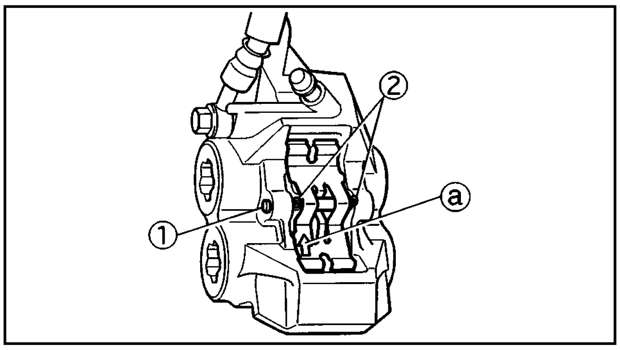


a. Connect a clear plastic hose ① tightly to the bleed screw ②. Put the other end of the hose into an open container.
b. Loosen the bleed screw and push the brake caliper pistons into the brake caliper with your finger.
c. Tighten the bleed screw.

   6 Nm (0.6 m•kg)

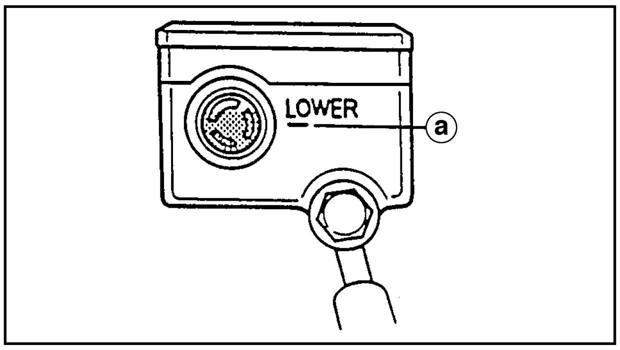
d. Install new brake pad shims onto the new brake pads.
e. Install new brake pads and a new brake pad spring.

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6. Install:
   - brake pad spring
   - pad pin ①
   - pad pin clips ②
   - brake caliper **42 Nm (4.2 m•kg)**

NOTE:
The arrow ⓐ on the brake pad spring must point in the direction of disc rotation.



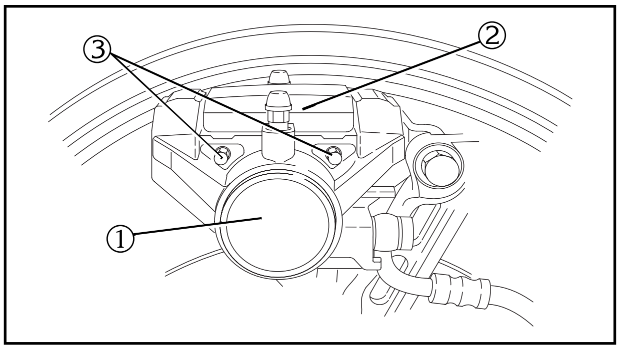
7. Check:
   - brake fluid level
     Below the minimum lever mark ⓐ → Add the recommended brake fluid to the proper level.
     Refer to “CHECKING THE BRAKE FLUID LEVEL” in Chapter 3.
8. Check:
   - brake lever operation
     Soft or spongy feeling → Bleed the brake system.
     Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” in Chapter 3.

EASB0021

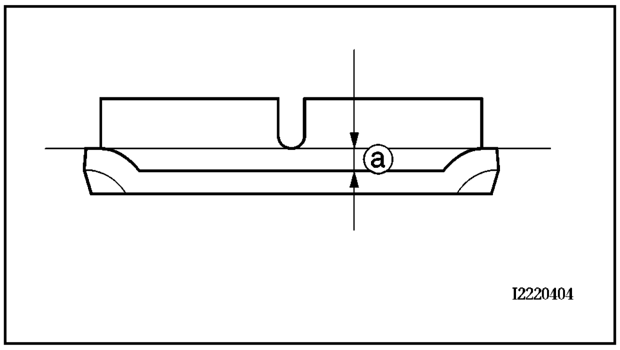
REPLACING THE REAR BRAKE PADS

NOTE:

When replacing the brake pads, it is not necessary to disconnect the brake hose or disassemble the brake caliper.



1. Remove:
   - rake caliper ①
2. Remove:
   - brake pad cover ②
   - pad pin clips
   - brake pad pins ③
3. Remove:
   - brake pad spring
   - brake pads
     (along with the brake pad shims)



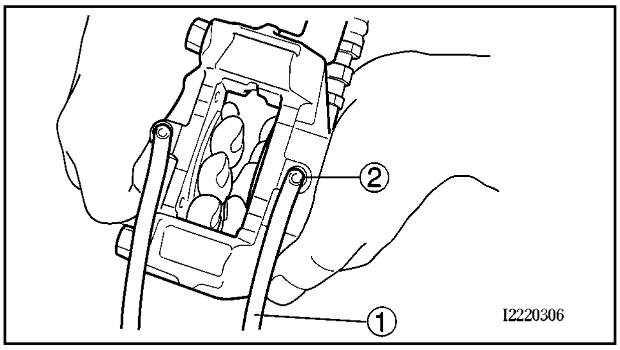
4. Measure:
   - brake pad wear limit ⓐ
     Out of specification → Replace the brake pads as a set.

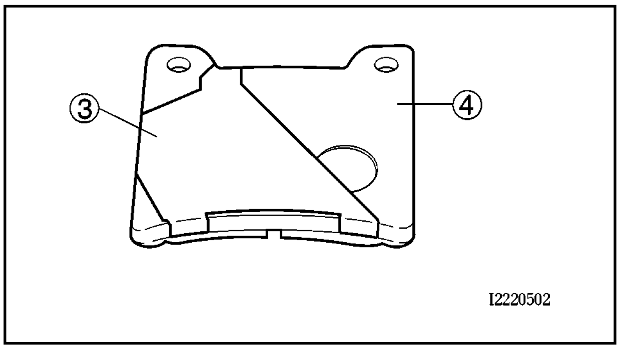
Brake pad wear limit
0.5 mm

5. Install:
   - brake pad shims
     (onto the brake pads)
   - brake pads
   - brake pad spring

NOTE:

Always install new brake pads, brake pad shims, and a brake pad spring as a set.





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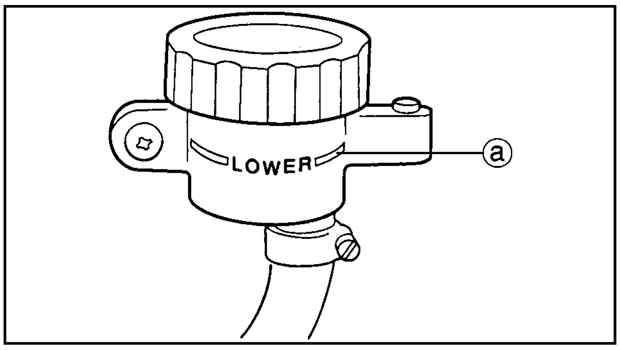
a. Connect a clear plastic hose ① tightly to the bleed screw ②. Put the other end of the hose into an open container.
b. Loosen the bleed screw and push the brake caliper pistons into the brake caliper with your finger.
c. Tighten the bleed screw.

   6 Nm (0.6 m•kg)

d. Install new brake pad shims ③ onto the new brake pads ④.
e. Install new brake pads and a new brake pad spring.

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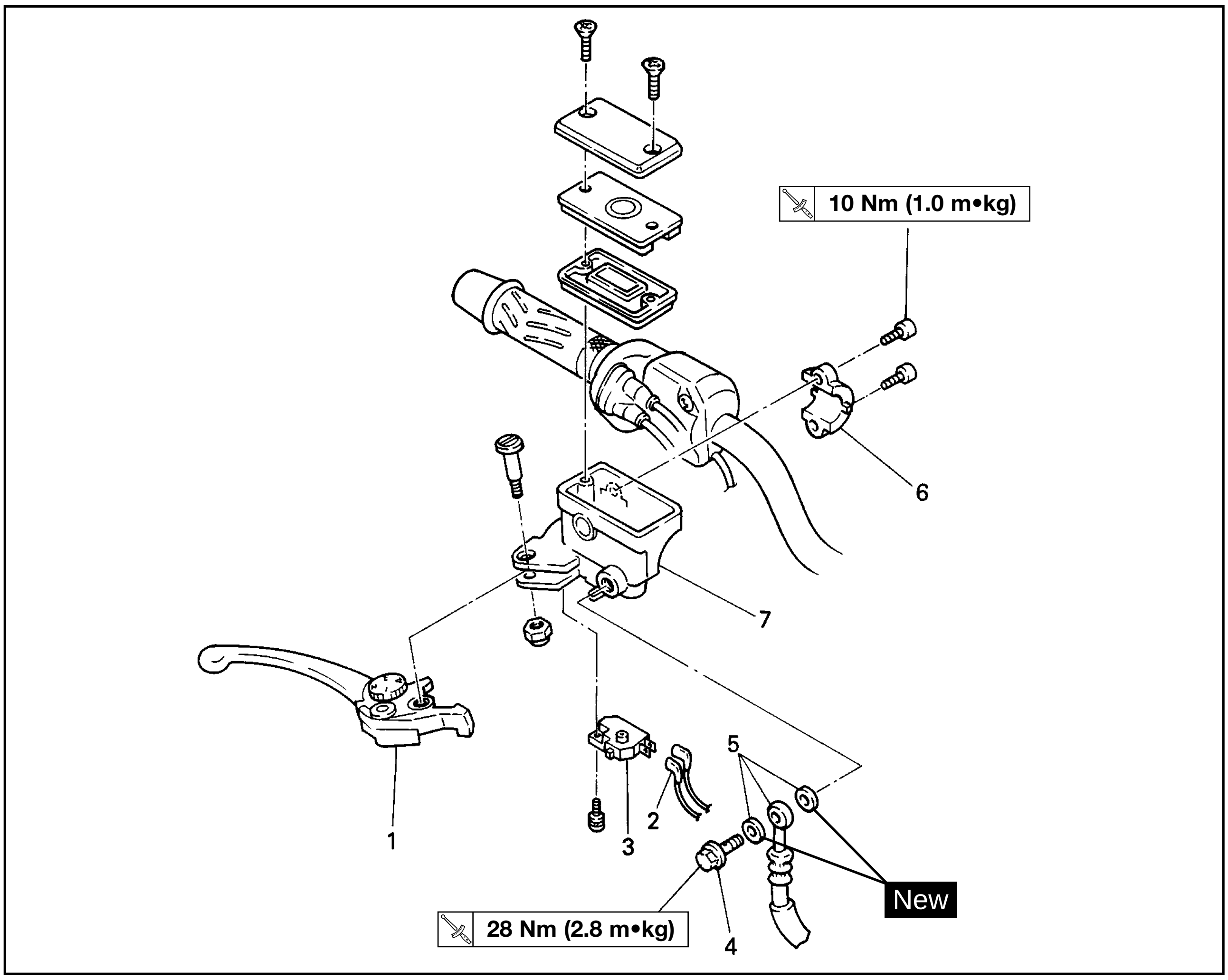
6. Install:
   - brake pad pins
   - pad pin clips
   - brake pad cover
   - brake caliper **35 Nm (3.5 m•kg)**



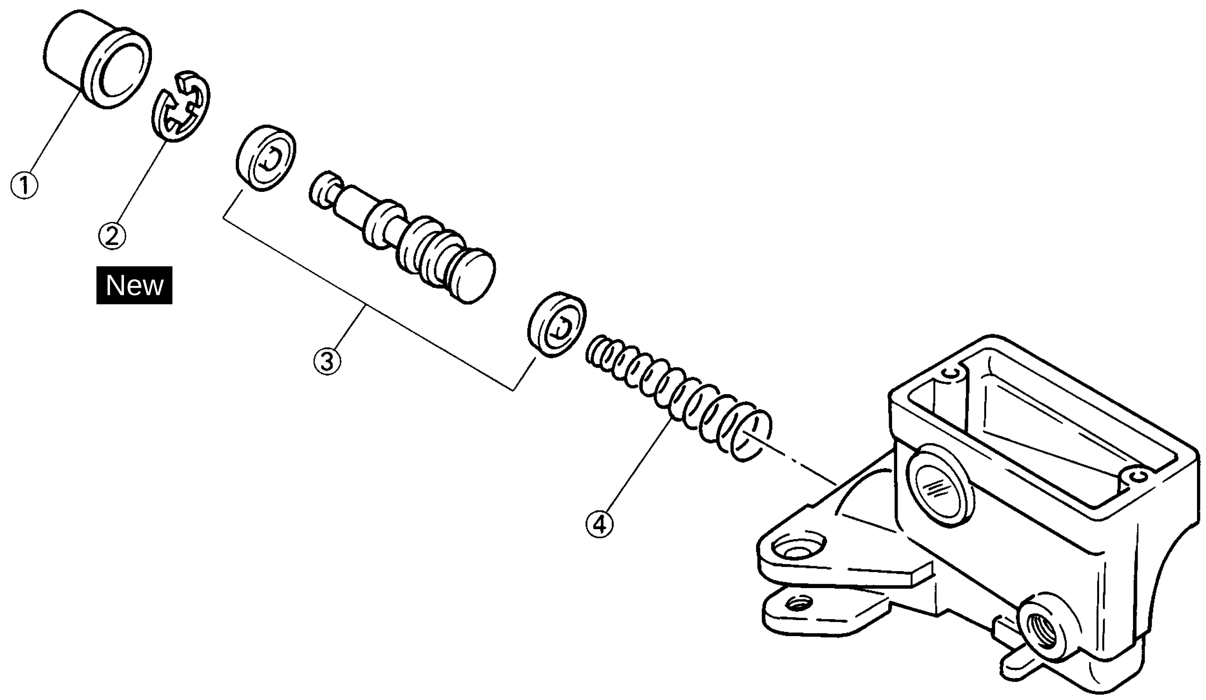
7. Check:
   - brake fluid level
     Below the minimum level mark ⓐ → Add the recommended brake fluid to the proper level.
     Refer to “CHECKING THE BRAKE FLUID LEVEL” in Chapter 3.

8. Check:
   - brake pedal operation
     Soft or spongy feeling → Bleed the brake system.
     Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” in Chapter 3.

FRONT BRAKE MASTER CYLINDER

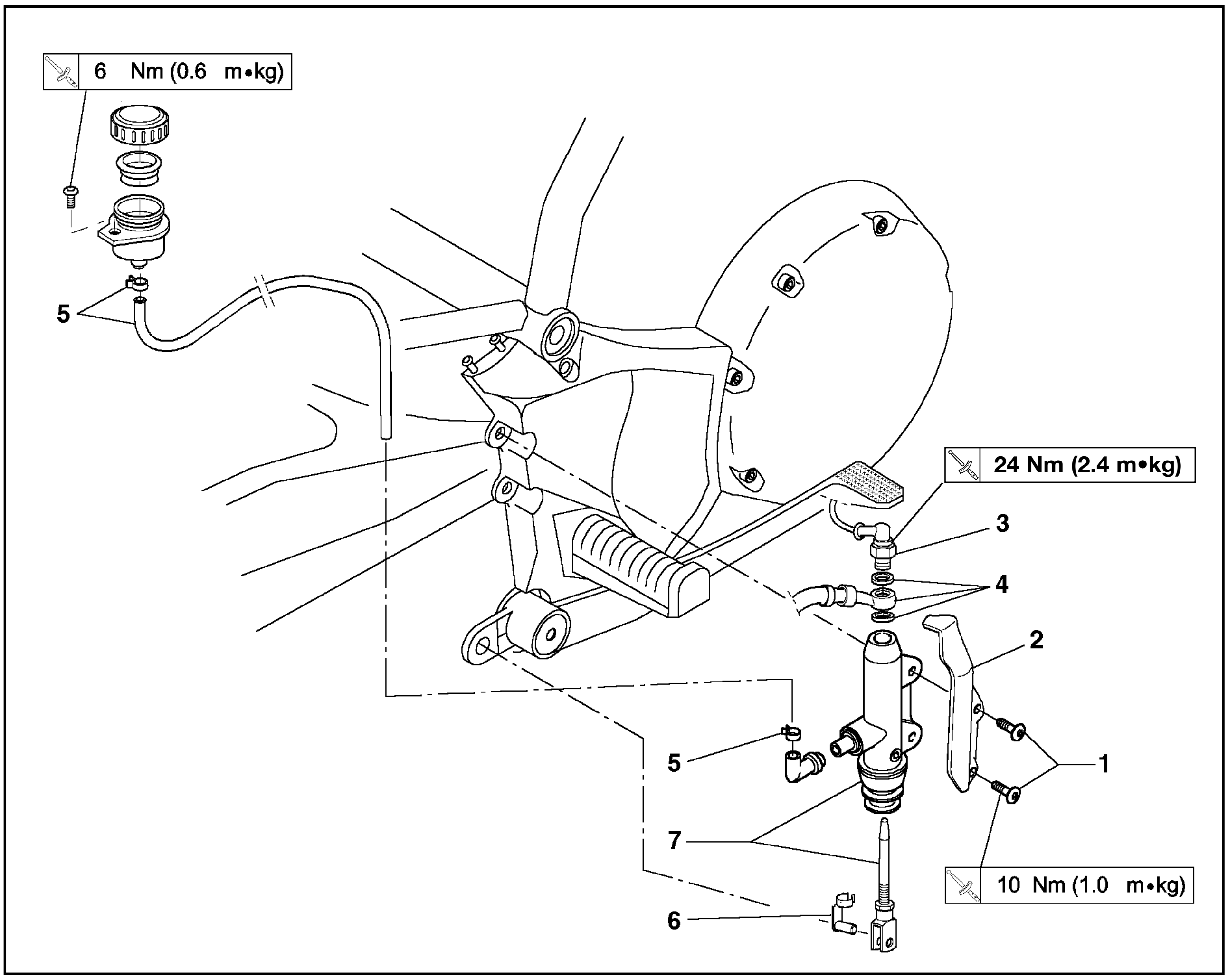


Order	Job name/Part name	Q'ty	Remarks
	Removing the front brake master cylinder		Remove the parts in the order listed.
	Drain the brake fluid		
1	Brake lever	1	
2	Front brake switch lead	2	
3	Front brake switch	1	
4	Union bolt	1	Refer to "REMOVING/INSTALLING THE FRONT BRAKE MASTER CYLINDER".
5	Copper washers/brake hose	2/1	
6	Master cylinder bracket	1	
7	Master cylinder	1	
			For installation, reverse the removal procedure.

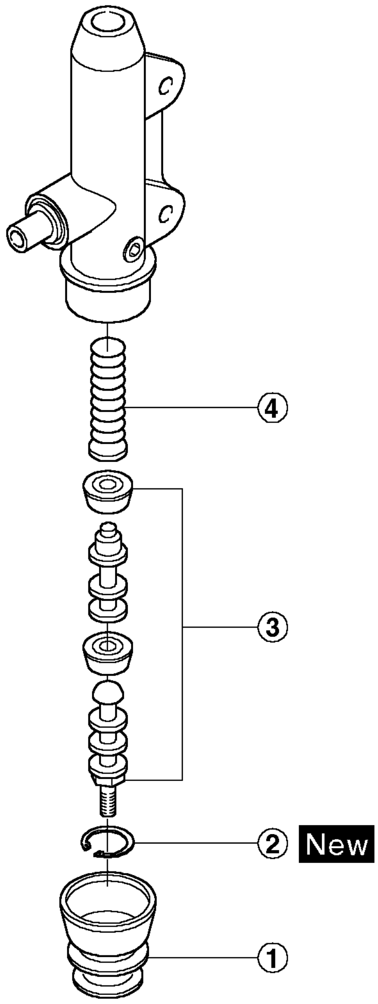


Order	Job name/Part name	Q'ty	Remarks
	Disassembling the front brake master cylinder		Remove the parts in the order listed.
①	Dust boot	1	
②	Circlip	1	
③	Master cylinder cup	1	
④	Spring	1	
			For assembly, reverse the disassembly procedure.

REAR BRAKE MASTER CYLINDER



Order	Job name/Part name	Q'ty	Remarks
	Removing the rear brake master cylinder		Remove the parts in the order listed.
	Side cover (right)		
	Drain the brake fluid		
1	Rear brake master cylinder bolts	2	
2	Rear brake master cylinder cover	1	
3	Union bolt/ brake switch	1	Refer to "REMOVING/INSTALLING THE REAR BRAKE MASTER CYLINDER".
4	Copper washers/brake hose	2/1	
5	Clamps/brake hose	2/1	
6	Clip	1	
7	Rear brake master cylinder	1	
			For installation, reverse the removal procedure.



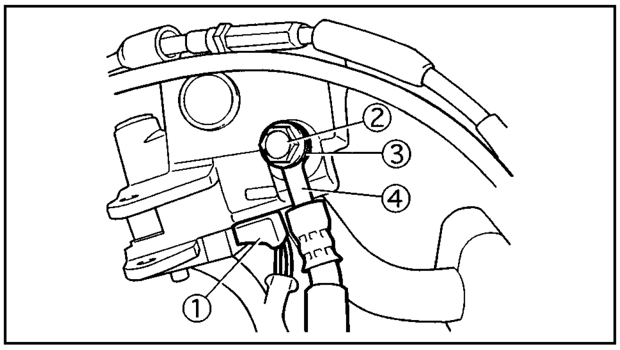
Order	Job name/Part name	Q'ty	Remarks
	Disassembling the rear brake master cylinder		Disassembly the parts in the order listed.
①	Master cylinder boot	1	
②	Circlip	1	
③	Master cylinder cup	1	
④	Spring	1	
			For assembly, reverse the disassembly procedure.

EB702210

REMOVING THE FRONT BRAKE MASTER CYLINDER

NOTE:

Before removing the front brake master cylinder, drain the brake fluid from the entire brake system.



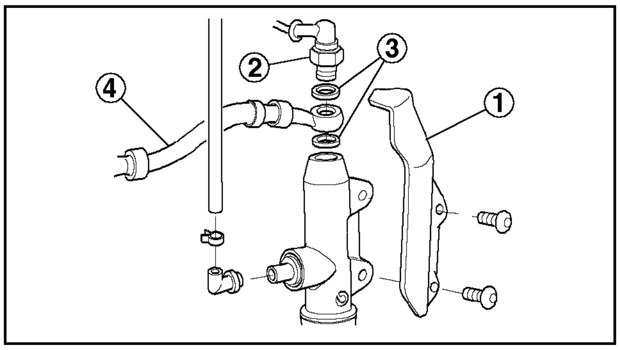
1. Disconnect:
   - brake switch leads ① (from brake switch)
2. Remove:
   - union bolt ②
   - copper washers ③
   - brake hose ④

NOTE:

To collect any remaining brake fluid, place a container under the master cylinder and the end of the brake hose.

EASB0022

REMOVING THE REAR BRAKE MASTER CYLINDER

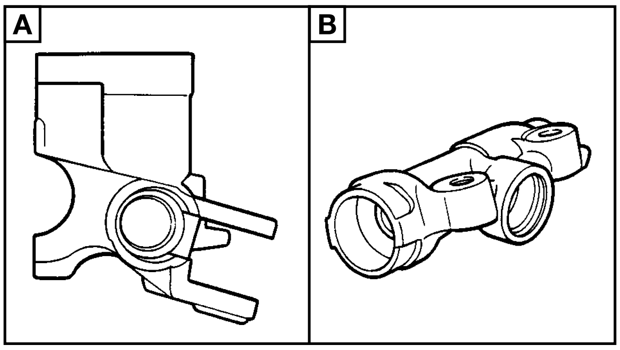


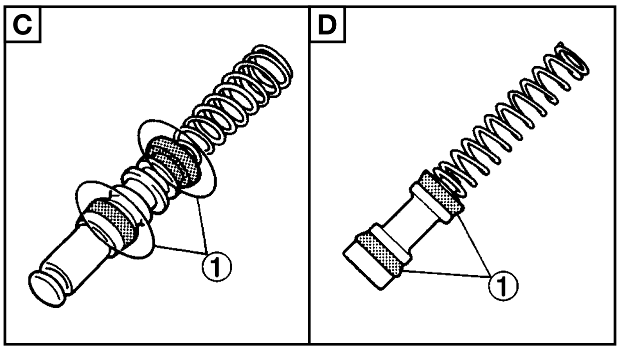
Before removing the rear brake master cylinder, drain the brake fluid from the entire brake system.

1. Remove:
   - side cover (right)
   - master cylinder cover ①
   - union bolt/brake switch ②
   - copper washers ③
   - brake hose ④

NOTE:

To collect any remaining brake fluid, place a container under the master cylinder and the end of the brake hose.





EB702242

CHECKING THE FRONT AND REAR BRAKE MASTER CYLINDERS

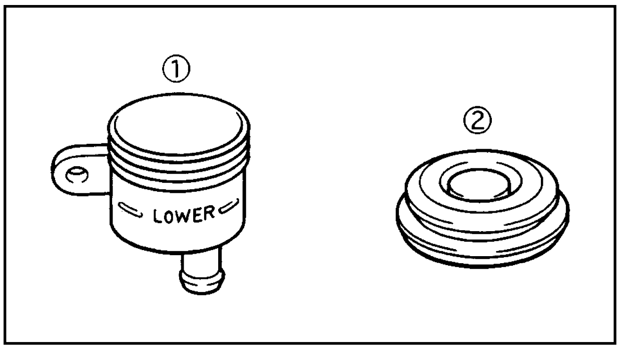
The following procedure applies to the both of the brake master cylinders.

1. Check:
   - brake master cylinder
     Damage/scratches/wear → Replace.
   - brake fluid delivery passages
     (brake master cylinder body)
     Obstruction → Blow out with compressed air.

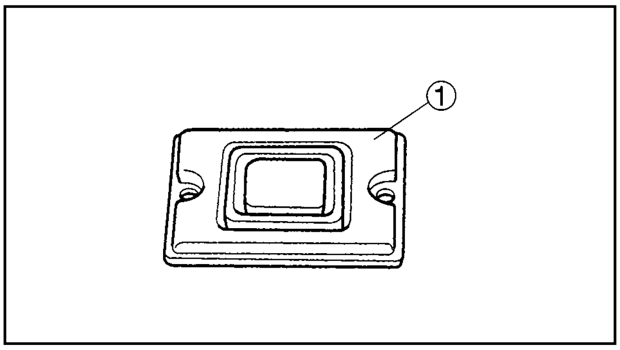
[A] Front
[B] Rear

2. Check:
   - brake master cylinder kit ①
     Damage/scratches/wear → Replace.

[C] Front
[D] Rear

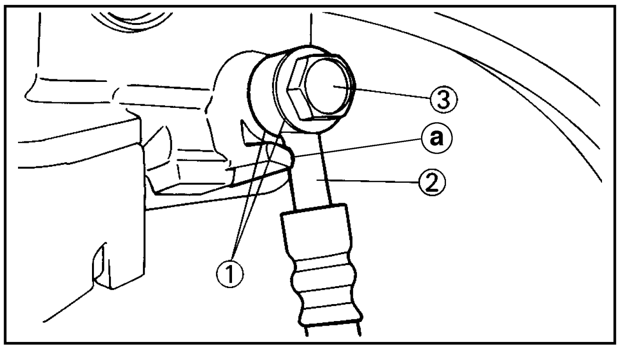


3. Check:
   - rear brake fluid reservoir ①
     Cracks/damage → Replace.
   - rear brake fluid reservoir diaphragm ②
     Cracks/damage → Replace.



4. Check:
   - front brake fluid reservoir diaphragm ②
     Cracks/damage → Replace.

5. Check:
   - brake hoses
     Cracks/damage/wear → Replace.



EB702270

INSTALLING THE FRONT BRAKE MASTER CYLINDER

⚠ WARNING

- **Before installation, all internal brake components should be cleaned and lubricated with clean or new brake fluid.**
- **Never use solvents on internal brake components.**

Recommended brake fluid
DOT 4

1. Install:
   - copper washers (New) ①
   - brake hose ②
   - union bolt ③

   28 Nm (2.8 m•kg)

⚠ WARNING

Proper brake hose routing is essential to insure safe motorcycle operation. Refer to “CABLE ROUTING”.

CAUTION:

When installing the brake hose onto the brake master cylinder make sure that the brake pipe touches the projection ⓐ of the master cylinder.

NOTE:

- While holding the brake hose, tighten the union bolt as shown.
- Turn the handlebar to the left and to the right to make sure that the brake hose does not touch other parts (e. g., wire harness, cables, leads). Correct if necessary.

2. Fill:
   - brake master cylinder reservoir
     (with the specified amount of the recommended brake fluid)

Recommended brake fluid
DOT 4

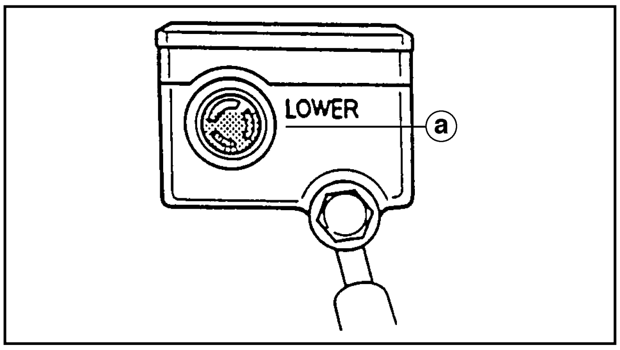
WARNING

- **Use only the designated brake fluid.**
- **Other brake fluids may cause the rubber seals to deteriorate, causing leakage and poor brake performance.**
- **Refill with the same type of brake fluid that is already in the system. Mixing brake fluids may result in a harmful chemical reaction, leading to poor brake performance.**
- **When refilling, be careful that water does not enter the reservoir. Water will significantly lower the boiling point of the brake fluid and could cause vapor lock.**

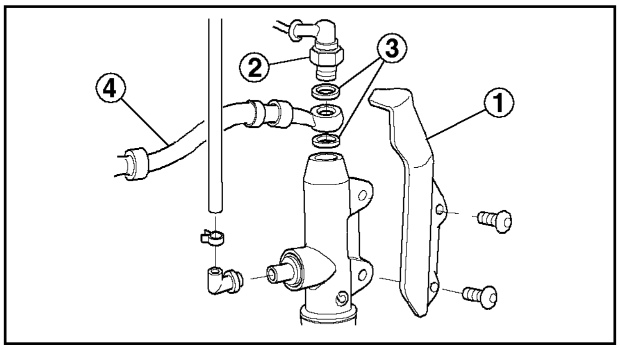
CAUTION:

Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any spilt brake fluid immediately.

3. Bleed:
   - brake system
     Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" in Chapter 3.



4. Check:
   - brake fluid level
     Below the minimum level mark ⓐ → Add the recommended brake fluid to the proper level.
     Refer to "CHECKING THE BRAKE FLUID LEVEL" in Chapter 3.
5. Check:
   - brake lever operation
     Soft or spongy feeling → Bleed the brake system.
     Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" in Chapter 3.



EASB0023

INSTALLING THE REAR BRAKE MASTER CYLINDER

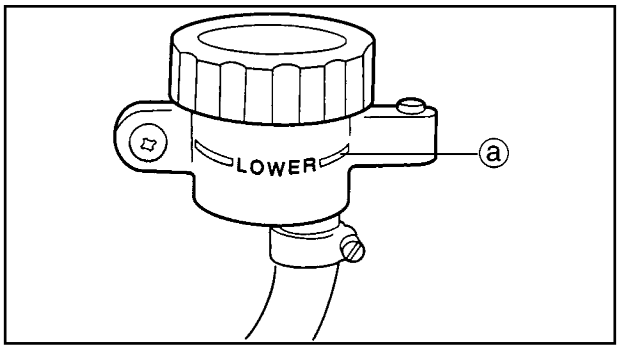
1. Install:
   - copper washers (New) ③
   - brake hose ④
   - union bolt ②

[torque]	**24 Nm (2.4 m•kg)**

   - master cylinder cover ①

⚠ WARNING

Proper brake hose routing is essential to insure safe motorcycle operation. Refer to "CABLE ROUTING".



2. Fill:
   - brake fluid reservoir
     (to the maximum level mark ⓐ)

[fluid]	**Recommended brake fluid** **DOT 4**

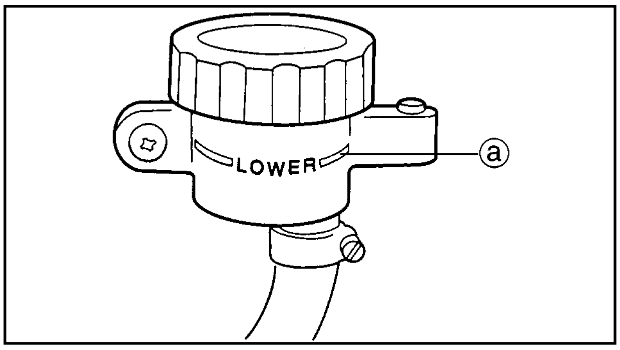
⚠ WARNING

- **Use only the designated brake fluid.**
- **Other brake fluids may cause the rubber seals to deteriorate, causing leakage and poor brake performance.**
- **Refill with the same type of brake fluid that is already in the system. Mixing brake fluids may result in a harmful chemical reaction, leading to poor brake performance.**
- **When refilling, be careful that water does not enter the reservoir. Water will significantly lower the boiling point of the brake fluid and could cause vapor lock.**

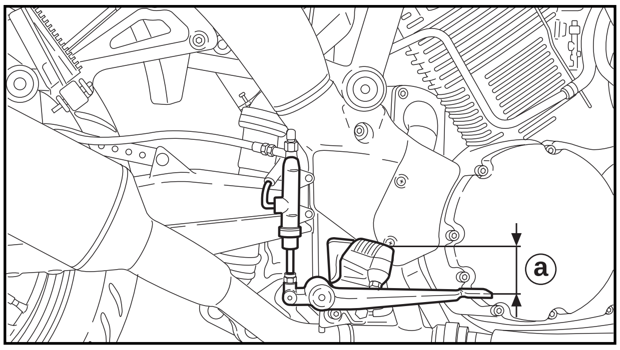
CAUTION:

Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any spilt brake fluid immediately.

3. Bleed:
   - brake system
     Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" in Chapter 3.



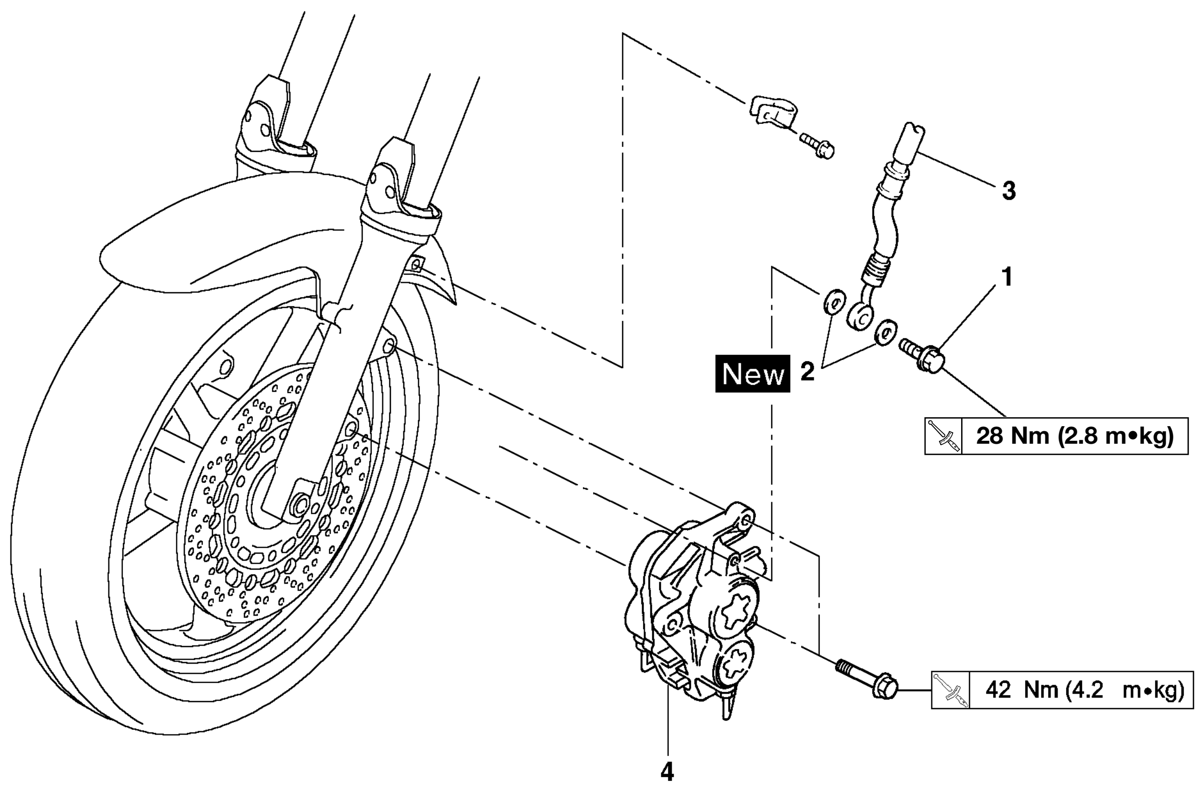
4. Check:
   - brake fluid level
     Below the minimum level mark ⓐ → Add the recommended brake fluid to the proper level.
     Refer to "CHECKING THE BRAKE FLUID LEVEL" in Chapter 3.



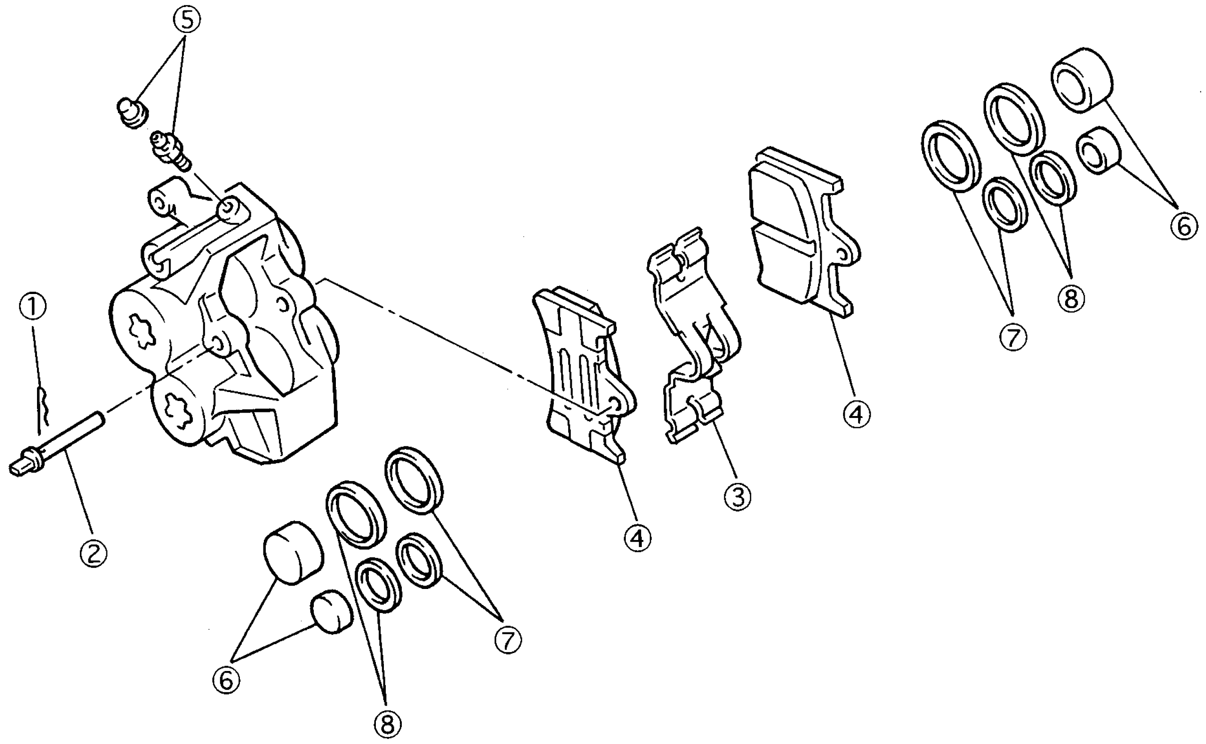
5. Adjust:
   - brake pedal position ⓐ
     Refer to "ADJUSTING THE REAR BRAKE" in Chapter 3.

Brake pedal position (below the top of the rider footrest)
43 mm

FRONT BRAKE CALIPERS

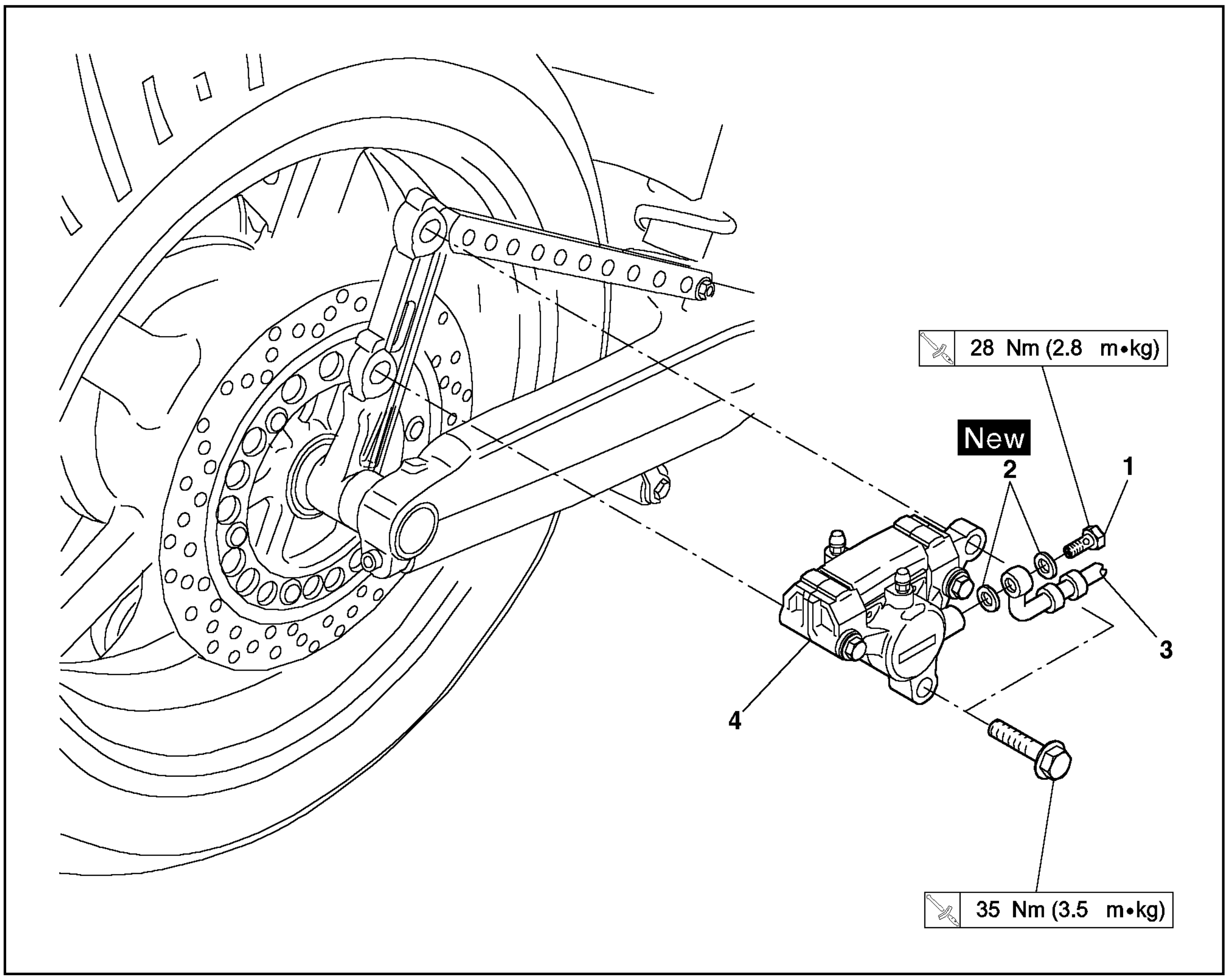


Order	Job name/Part name	Q'ty	Remarks
	Removing the front brake calipers		Remove the parts in the order listed.
	Drain the brake fluid		
1	Union bolt	1	Refer to "REMOVING/INSTALLING THE FRONT BRAKE CALIPERS".
2	Copper washers	2	
3	Brake hose	1	
4	Brake caliper assembly	1	
			For installation, reverse the removal procedure.

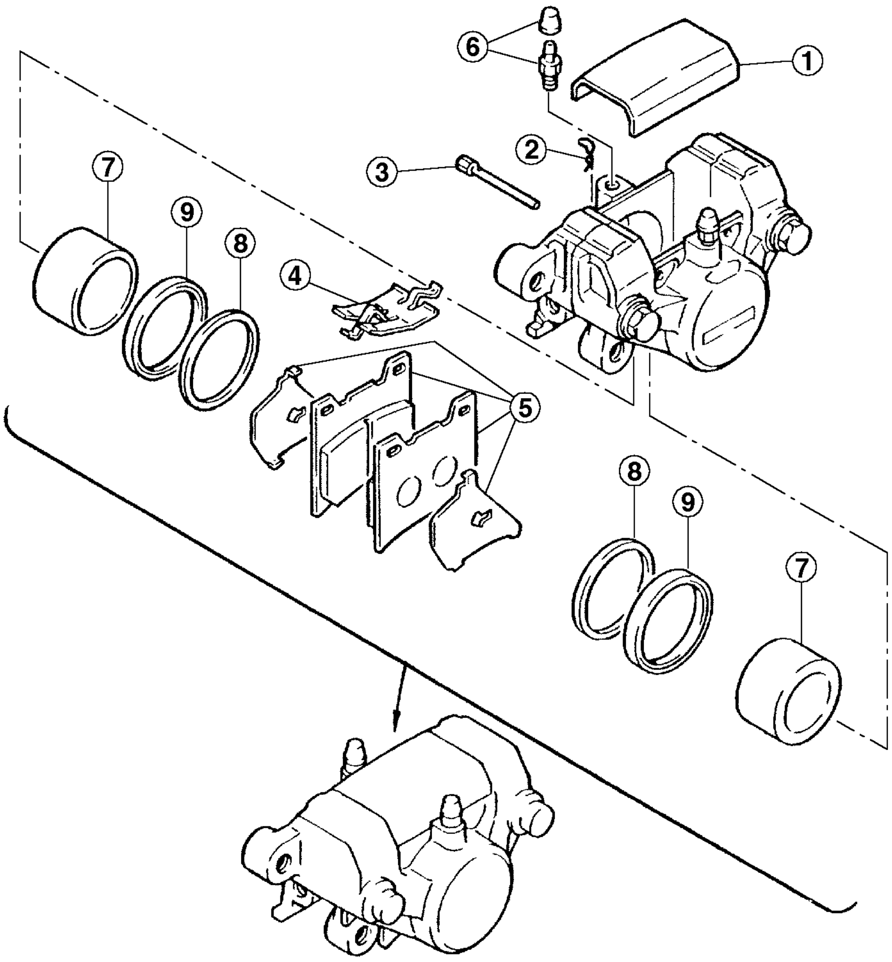


Order	Job name/Part name	Q'ty	Remarks
	Disassembling the front brake calipers		Remove the parts in the order listed.
①	Pad pin clips	2	Refer to "REPLACING THE FRONT BRAKE PADS".
②	Pad pin	1	
③	Pad spring	1	
④	Brake pads	2	
⑤	Bleed screw	1	
⑥	Brake caliper pistons	4	Refer to "DISASSEMBLING THE FRONT BRAKE CALIPER".
⑦	Dust seals	4	
⑧	Caliper piston seals	4	
			For assembly, reverse the disassembly procedure.

REAR BRAKE CALIPER



Order	Job name/Part name	Q'ty	Remarks
	Removing the rear brake calipers		Remove the parts in the order listed.
	Drain the brake fluid		
1	Union bolt	1	Refer to “REMOVING/INSTALLING THE REAR BRAKE CALIPERS”.
2	Copper washers	2	
3	Brake hose	1	
4	Brake caliper assembly	1	
			For installation, reverse the removal procedure.



Order	Job name/Part name	Q'ty	Remarks
	Disassembling the rear brake caliper		Disassembly the parts in the order listed.
①	Cover	1	
②	Pin clips	2	
③	Pad pins	2	Refer to "REPLACING THE REAR BRAKE PADS".
④	Pad spring	1	
⑤	Brake pads/shim	2/2	
⑥	Bleed screw	2	
⑦	Caliper pistons	2	Refer to "DISASSEMBLING THE REAR BRAKE CALIPER".
⑧	Dust seals	2	
⑨	Piston seals	2	
			For assembly, reverse the disassembly procedure.

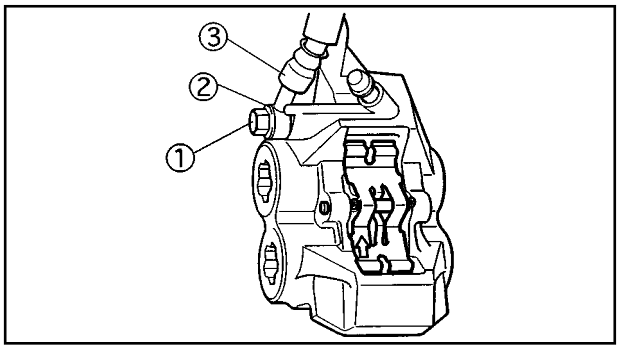
EB702317

DISASSEMBLING THE FRONT BRAKE CALIPER

The following procedure applies to both of the brake calipers.

NOTE:

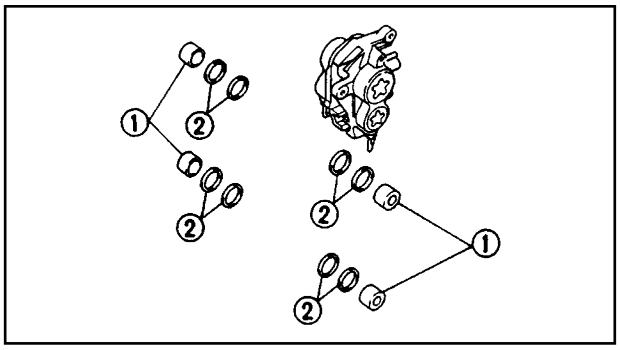
Before removing either brake caliper, drain the brake fluid from the entire brake system.



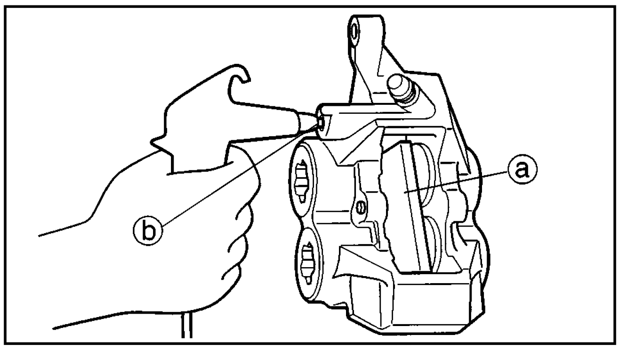
1. Remove:
   - union bolt ①
   - copper washers ②
   - brake hose ③

NOTE:

Put the end of the brake hose into a container and pump out the brake fluid carefully.

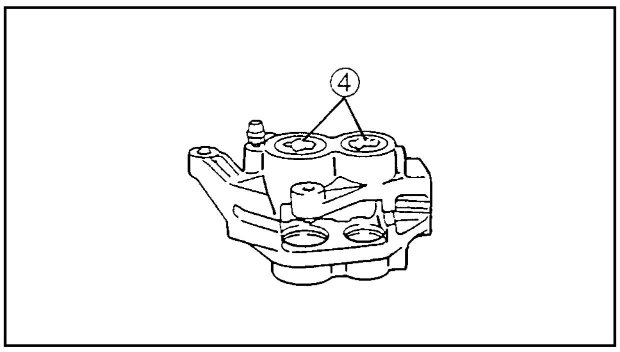


2. Remove:
   - brake caliper pistons ①
   - brake caliper piston seals ②



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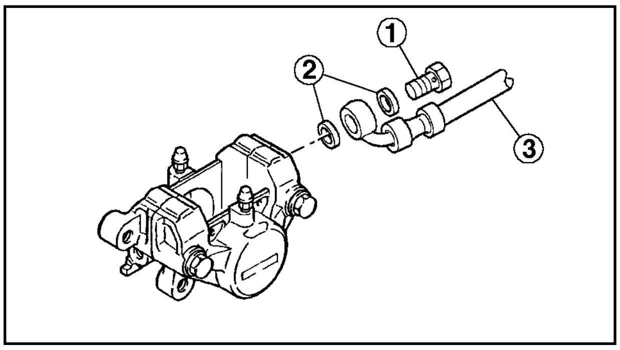
a. Secure the right side brake caliper piston with a piece of wood ⓐ
b. Blow compressed air into the brake hose joint ⓑ opening to force out the pistons from the brake caliper.
c. Remove the brake caliper piston seals.
d. Repeat the previous steps to force out the right side piston from the brake caliper.



⚠ WARNING

- **Never try to pry out the brake caliper pistons.**
- **Do not remove the plugs ④.**

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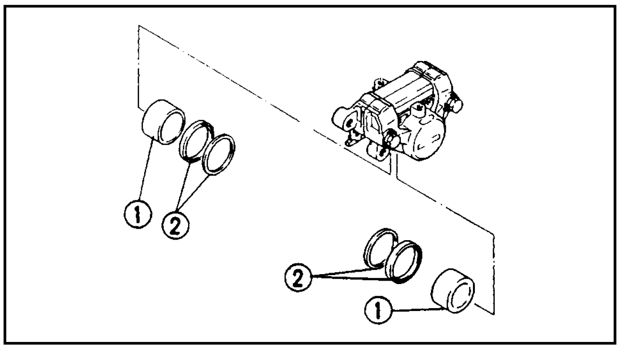
EB702322

DISASSEMBLING THE REAR BRAKE CALIPER

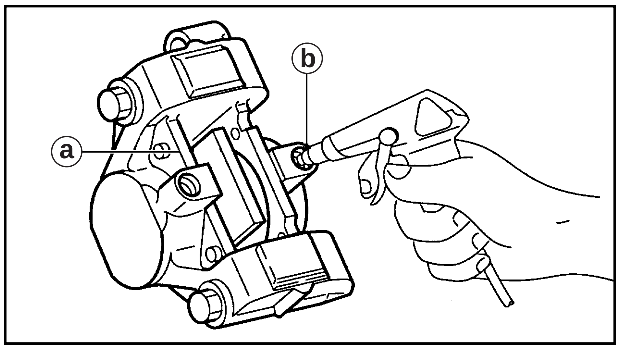
NOTE:
Before removing the brake caliper, drain the brake fluid from the entire brake system.

1. Remove:
   - union bolt ①
   - copper washers ②
   - brake hose ③

NOTE:
Put the end of the brake hose into a container and pump out the brake fluid carefully.



2. Remove:
   - brake caliper pistons ①
   - brake caliper pistons seals ②

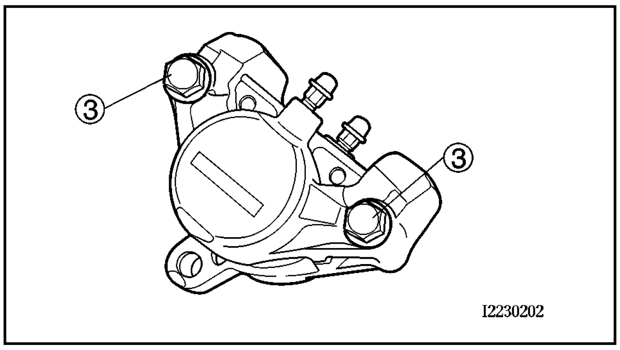


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a. Secure the right side brake caliper piston with a piece of wood ⓐ
b. Blow compressed air into the brake hose joint opening ⓑ to force out the left side piston from the brake caliper.

WARNING

- **Never try to pry out the brake caliper pistons.**
- **Do not loosen the bolts ③.**



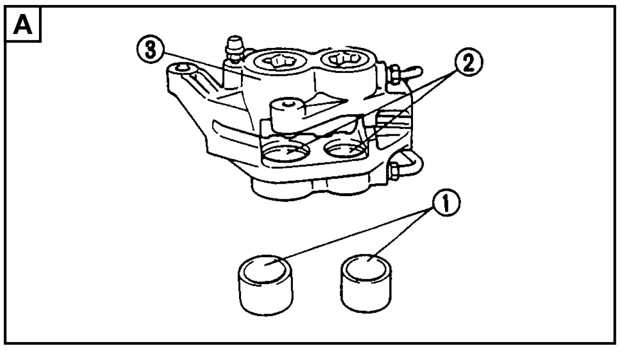
c. Remove the brake caliper piston seals.
d. Repeat the previous steps to force out the right side piston from the brake caliper.

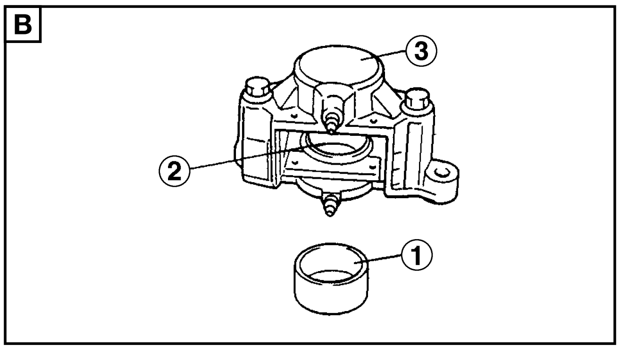
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EB702343

CHECKING THE FRONT AND REAR BRAKE CALIPERS

Recommended brake component replacement schedule	
Brake pads	If necessary
Piston seals	Every two years
Brake hoses	Every four years
Brake fluid	Every two years and whenever the brake is disassembled.



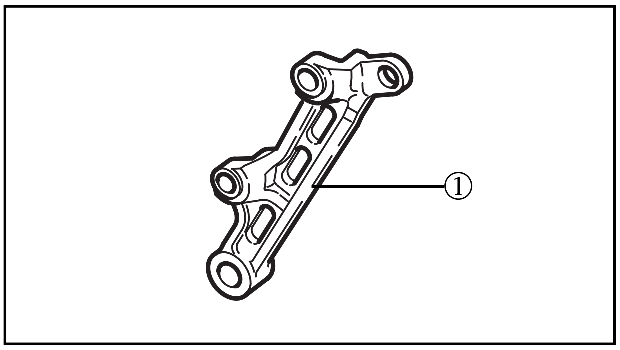


1. Check:
   - brake caliper pistons ①
     Rust/scratches/wear → Replace the brake caliper piston assembly.
   - brake caliper cylinders ②
     Scratches/wear→Replace the brake caliper.
   - brake calipers ③
     Cracks/damage → Replace.
   - brake fluid delivery passages
     (brake caliper body)
     Obstruction → Blow out with compressed air.

⚠ WARNING

Whenever a brake caliper is disassembled, replace the brake caliper piston seals.

[A] Front
[B] Rear



2. Check:
   - brake caliper brackets ①
     Cracks/damage → Replace.

EB702374

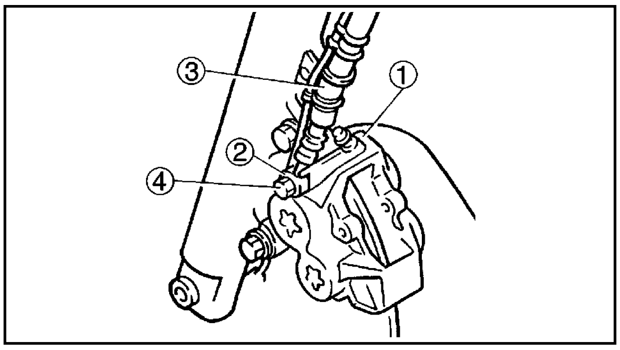
INSTALLING THE FRONT BRAKE CALIPERS

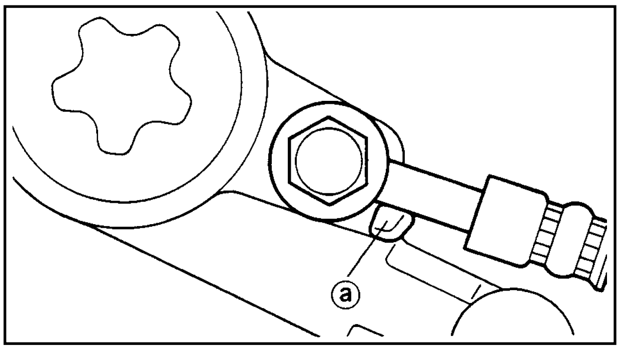
The following procedure applies to both of the brake calipers.

WARNING

- **Before installation, all internal brake components should be cleaned and lubricated with clean or new brake fluid.**
- **Never use solvents on internal brake components as they will cause the piston seals to swell and distort.**
- **Whenever a brake caliper is disassembled, replace the brake caliper piston seals.**

Recommended brake fluid
DOT 4





1. Install:
   - brake caliper ① (temporarily)
   - copper washers (New) ②
   - brake hose ③
   - union bolt ④

28 Nm (2.8 m•kg)

WARNING

Proper brake hose routing is essential to insure safe motorcycle operation. Refer to “CABLE ROUTING”.

CAUTION:

When installing the brake hose onto the brake caliper, make sure that the brake pipe touches the projection ⓐ on the brake caliper.

2. Remove:
   - brake caliper
3. Install:
   - brake pads
   - pad spring
   - pad pin
   - pad pin clips
   - brake caliper
   - brake hose holder
     Refer to “REPLACING THE FRONT BRAKE PADS”.

	Brake caliper retaining bolt **42 Nm (4.2 m•kg)**

4. Fill:
   - brake master cylinder reservoir
     (with the specified amount of the recommended brake fluid)

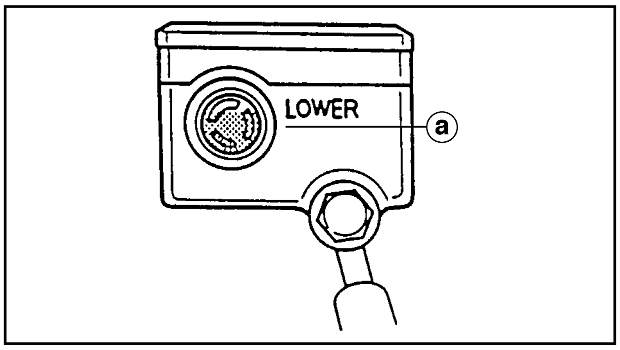
	Recommended brake fluid **DOT 4**

WARNING

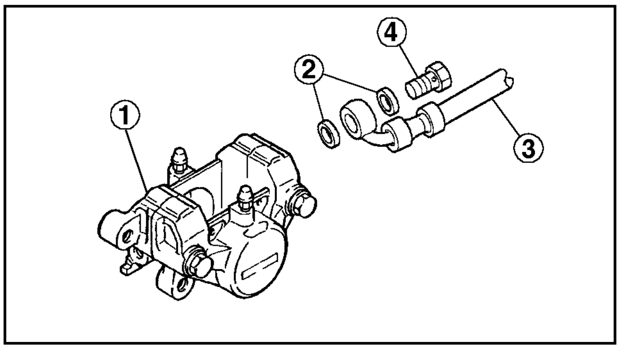
- **Use only the designated brake fluid.**
- **Other brake fluids may cause the rubber seals to deteriorate, causing leakage and poor brake performance.**
- **Refill with the same type of brake fluid that is already in the system. Mixing brake fluids may result in a harmful chemical reaction, leading to poor brake performance.**
- **When refilling, be careful that water does not enter the reservoir. Water will significantly lower the boiling point of the brake fluid and could cause vapor lock.**

CAUTION:

Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any spilt brake fluid immediately.



5. Bleed:
   - brake system
     Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" in Chapter 3.
6. Check:
   - brake fluid level
     Below the minimum level mark ⓐ → Add the recommended brake fluid to the proper level.
     Refer to "CHECKING THE BRAKE FLUID LEVEL" in Chapter 3.
7. Check:
   - brake lever operation
     Soft or spongy feeling → Bleed the brake system.
     Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" in Chapter 3.



EASB0024

INSTALLING THE REAR BRAKE CALIPER

WARNING

- **Before installation, all internal brake components should be cleaned and lubricated with clean or new brake fluid.**
- **Never use solvents on internal brake components as they will cause the piston seals to swell and distort.**
- **Whenever a brake caliper is disassembled, replace the brake caliper piston seals.**

	Recommended brake fluid **DOT 4**

1. Install:
   - brake caliper ①
     (temporarily)
   - copper washers (New) ②
   - brake hose ③
   - union bolt ④

   28 Nm (2.8 m•kg)

WARNING

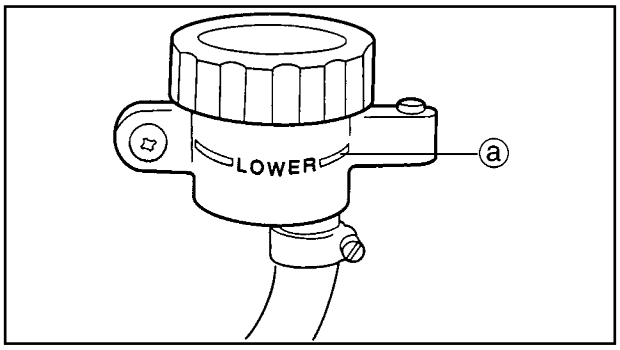
Proper brake hose routing is essential to insure safe motorcycle operation. Refer to “CABLE ROUTING”.

CAUTION:

When installing the brake hose onto the brake caliper, make sure that the brake pipe touches the projection on the caliper.

2. Remove:
   - brake caliper
3. Install:
   - brake pads/shims
   - pad spring
   - pad pin
   - pad pin clips
   - cover
   - brake caliper
     Refer to “REAR BRAKE PADS”.

	Brake caliper retaining bolt **35 Nm (3.5 m•kg)**



4. Fill:
   - brake master cylinder reservoir
     (with the specified amount of the recommended brake fluid)

	Recommended brake fluid **DOT 4**

⚠ WARNING

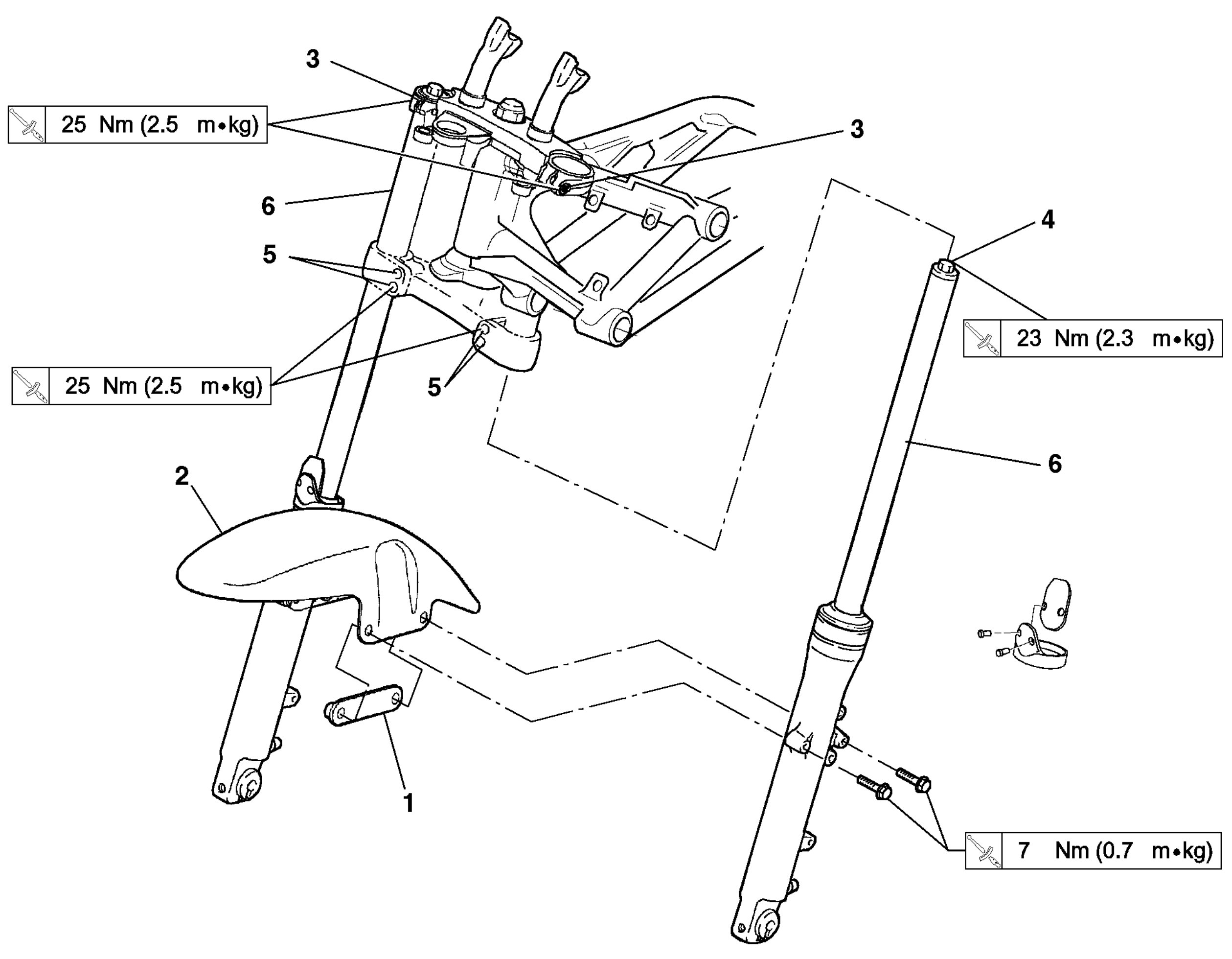
- **Use only the designated brake fluid.**
- **Other brake fluids may cause the rubber seals to deteriorate, causing leakage and poor brake performance.**
- **Refill with the same type of brake fluid that is already in the system. Mixing brake fluids may result in a harmful chemical reaction, leading to poor brake performance.**
- **When refilling, be careful that water does not enter the reservoir. Water will significantly lower the boiling point of the brake fluid and could cause vapor lock.**

CAUTION:

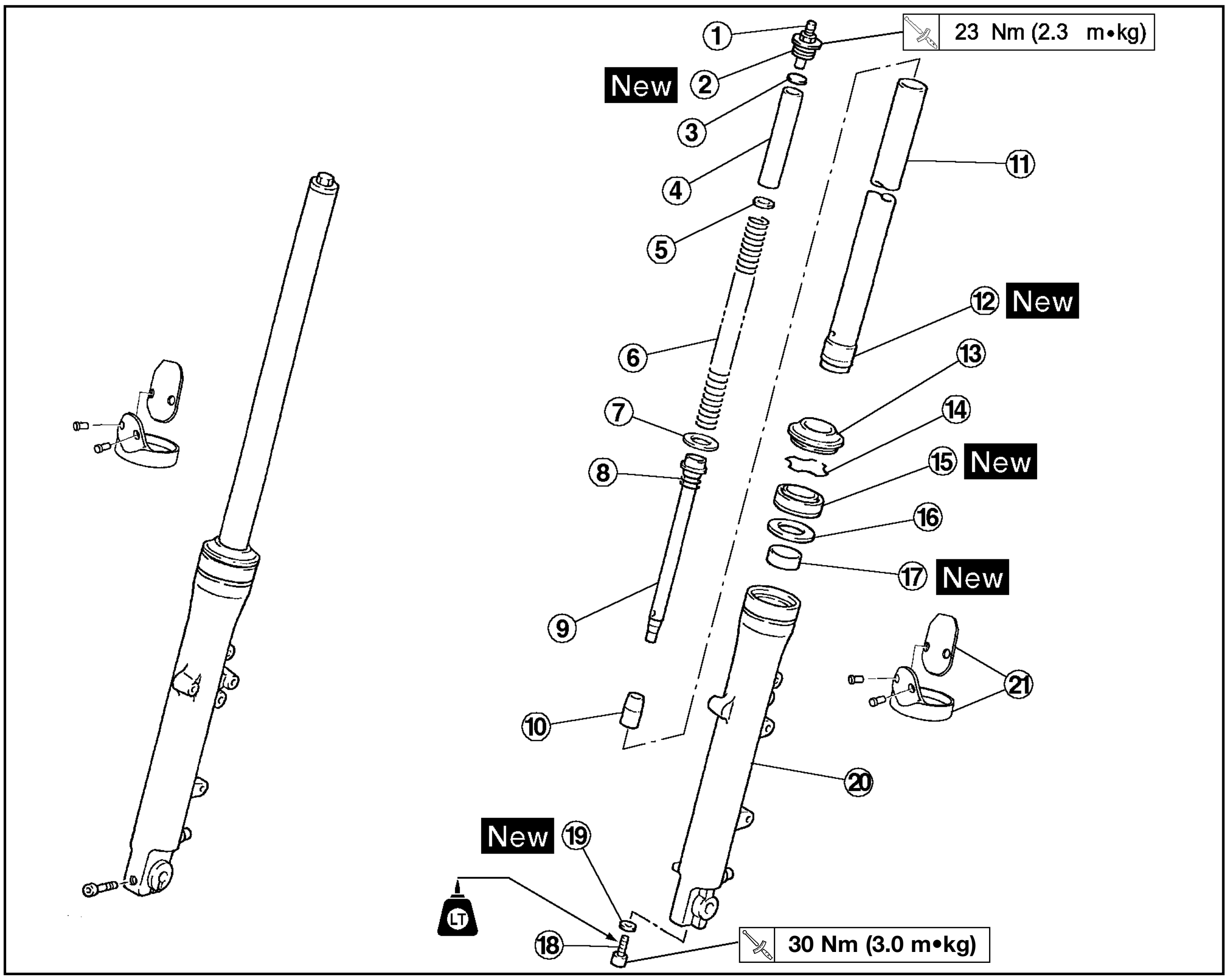
Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any spilt brake fluid immediately.

5. Bleed:
   - brake system
     Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” in Chapter 3.
6. Check:
   - brake fluid level
     Below the minimum level mark ⓐ → Add the recommended brake fluid to the proper level.
     Refer to “CHECKING THE BRAKE FLUID LEVEL” in Chapter 3.
7. Check:
   - brake pedal operation
     Soft or spongy feeling → bleed the brake system.
     Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” in Chapter 3.

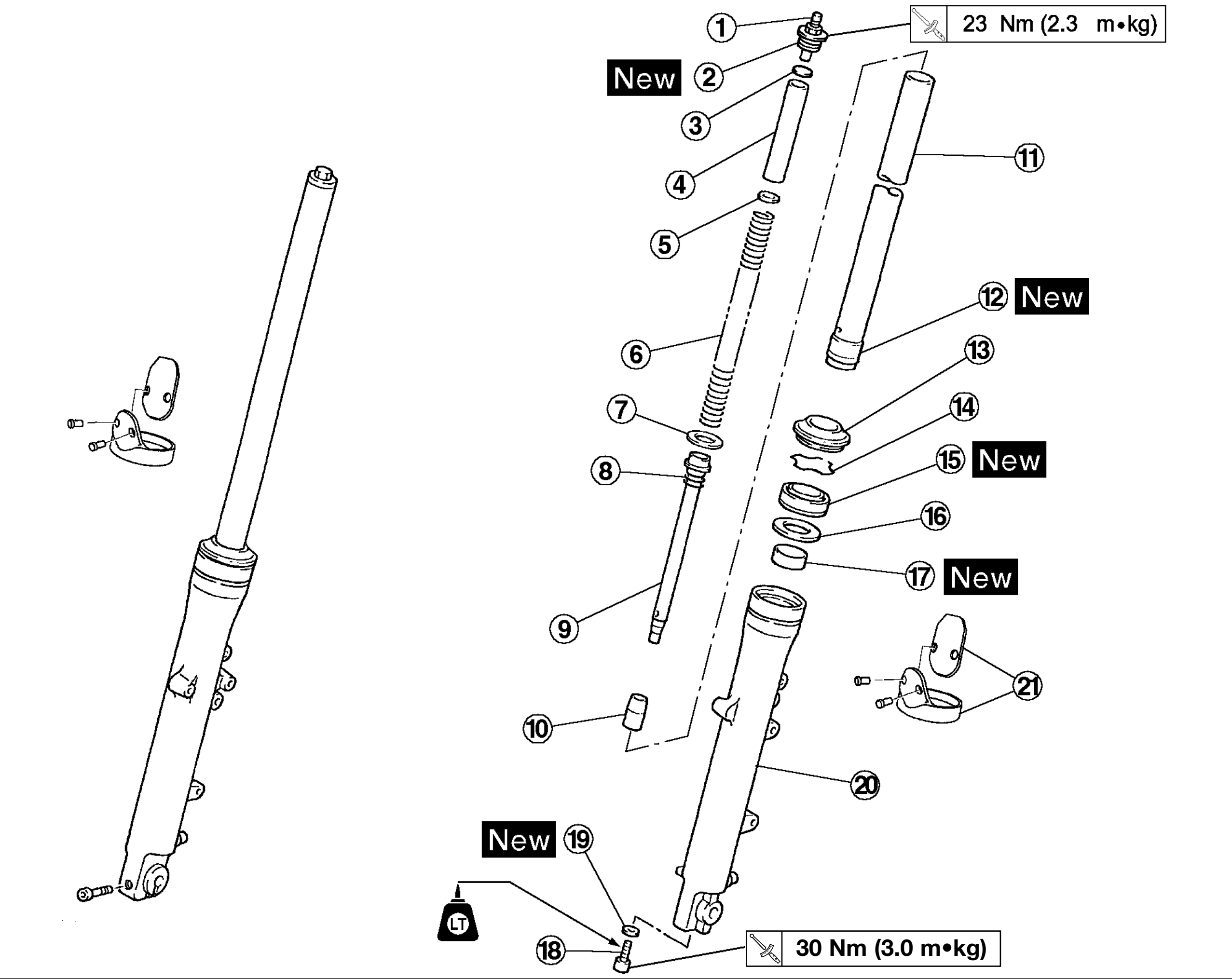
FRONT FORK



Order	Job name/Part name	Q'ty	Remarks
	Removing the front fork		Remove the parts in the order listed.
	Front wheel		Refer to "FRONT WHEEL AND BRAKE DISCS".
	Brake caliper assembly		
	Cowling		Lift forward
1	Bracket	2	
2	Front fender	1	
3	Upper bracket bolts	2	Refer to "REMOVING/INSTALLING THE FRONT FORK LEGS".
4	Cap bolts	2	
5	Lower bracket bolts	4	
6	Front fork legs	1/1	
			For installation, reverse the removal procedure.



Order	Job name/Part name	Q'ty	Remarks
	Disassembling the front fork		Disassemble the parts in the order listed.
①	Cap bolt	2	
②	O-ring	2	
③	Washer	2	
④	Spacer	2	
⑤	Spring seat	2	
⑥	Fork spring	2	
⑦	Piston ring	2	Refer to "DISASSEMBLING/ ASSEMBLING THE FRONT FORK LEGS".
⑧	Rebound spring	2	
⑨	Damper rod	2	
⑩	Oil lock piece	2	
⑪	Inner tube	2	
⑫	Inner tube bushing	2	
⑬	Dust seal	2	
⑭	Oil seal clip	2	



Order	Job name/Part name	Q'ty	Remarks
⑮	Oil seal	2	Refer to "DISASSEMBLING/ ASSEMBLING THE FRONT FORK LEGS".
⑯	Oil seal washer	2	
⑰	Outer tube bushing	2	
⑱	Damper rod bolt	2	
⑲	Gasket	2	
⑳	Outer tube	2	
㉑	Protector	2	
			For assembly, reverse the disassembly procedure.

EAS00649

REMOVING THE FRONT FORK LEGS

The following procedure applies to both of the front fork legs.

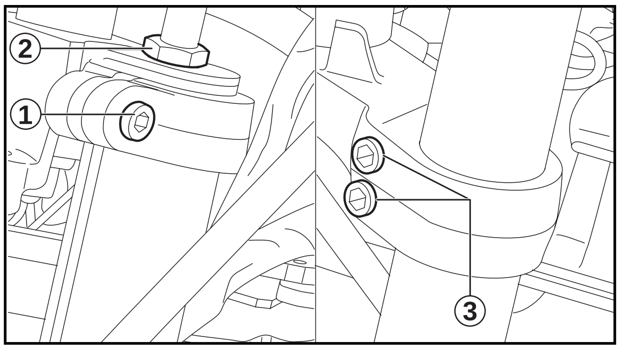
1. Stand the motorcycle on a level surface.

⚠ WARNING

Securely support the motorcycle so that there is no danger of it falling over.

NOTE:

Place the motorcycle on a suitable stand so that the front wheel is elevated.



2. Loosen:
   - upper bracket pinch bolt ①
   - cap bolt ②
   - lower bracket pinch bolt ③

⚠ WARNING

Before loosening the upper and lower bracket pinch bolts, support the front fork leg.

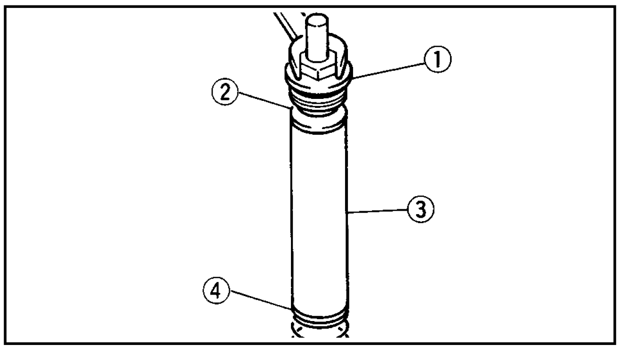
3. Remove:
   - front fork leg

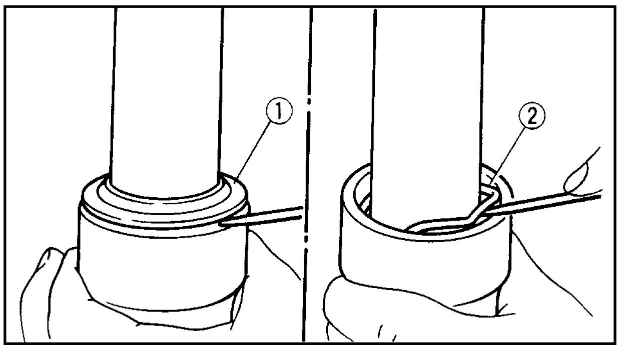
EAS00653

DISASSEMBLING THE FRONT FORK LEGS

The following procedure applies to both of the front fork legs.

1. Loosen the spring preload adjusting bolt completely.
2. Remove:
   - cap bolt ①
   - washer ②
   - spacer ③
   - spring seat ④
   - fork spring
3. Drain:
   - fork oil

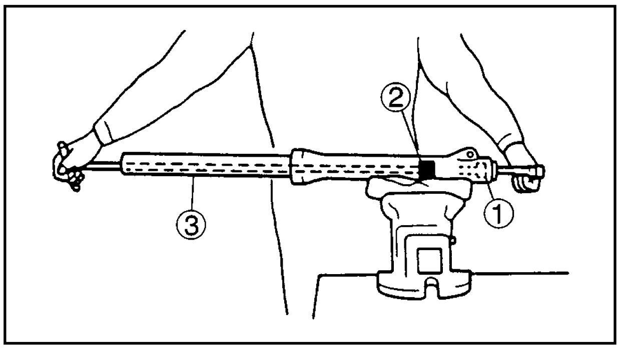




4. Remove:
   - dust seal ①
   - oil seal clip ②
     (with a flat-head screwdriver)

CAUTION:

Do not scratch the inner tube.

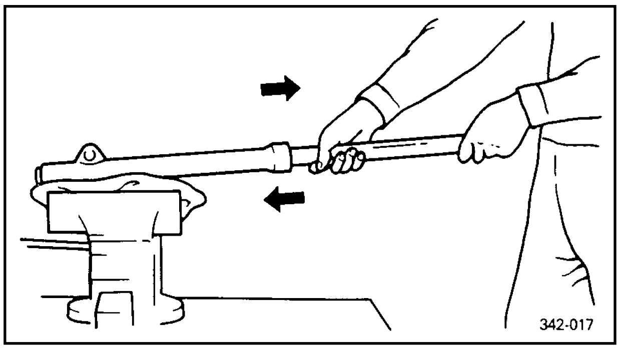


5. Remove:
   - damper rod bolt ①

NOTE:

While holding the damper rod with the T-handle ③ and damper rod holder ②, loosen the damper rod bolt.

	Damper rod holder (30 mm) **90890-01327** **T-handle** **90890-01326**



6. Remove:
   - inner tube

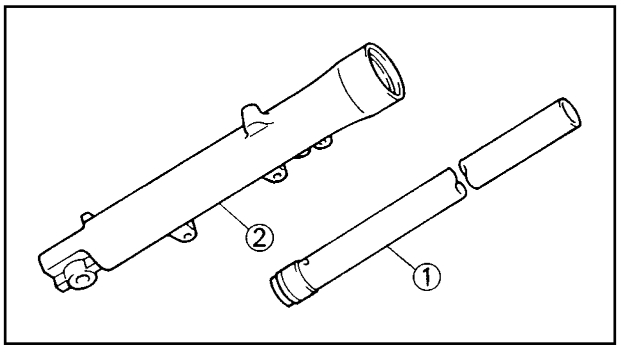
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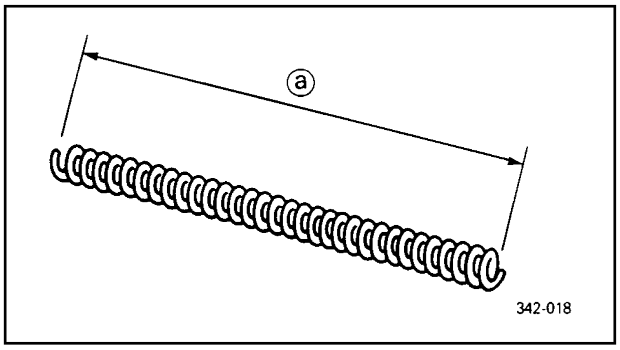
a. Hold the front fork leg horizontally.
b. Lock firmly the brake caliper fastener in a vice with protected jaws.
c. Slowly push the inner tube into the outer tube and just before it bottoms out, pull the inner tube back quickly.

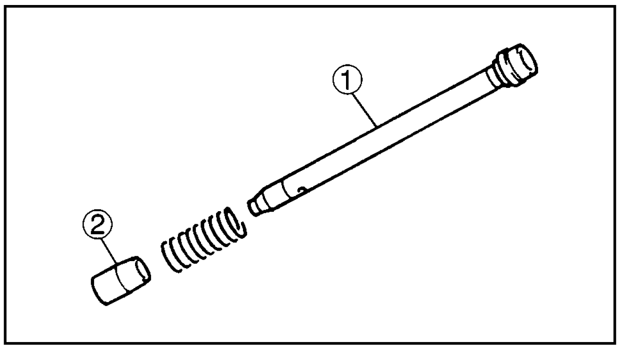
CAUTION:

- **Excessive force will damage the oil seal and bushing. A damaged oil seal or bushing must be replaced.**
- **Avoid bottoming the inner tube into the outer tube during the above procedure, as the oil flow stopper will be damaged.**

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EAS00657

CHECKING THE FRONT FORK LEGS

The following procedure applies to both of the front fork legs.

1. Check:
   - inner tube ①
   - outer tube ②
   Bends/damage/scratches → Replace.

WARNING

Do not attempt to straighten a bent inner tube as this may dangerously weaken it.

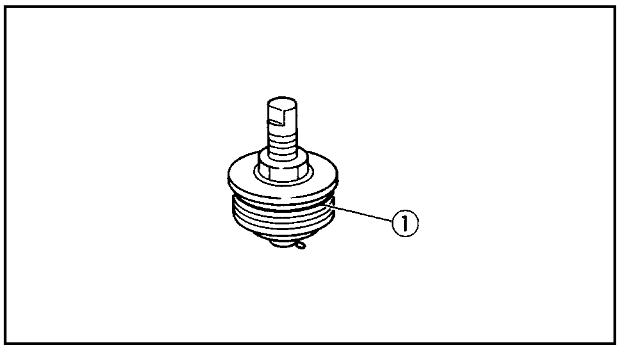
2. Measure:
   - spring free length ⓐ
   Over the specified limit → Replace.

	Spring free length limit **363.3 mm**

3. Check:
   - damper rod ①
   Damage/wear → Replace.
   Obstruction → Blow out all of the oil passages with compressed air.
   - oil lock piece ②
   Damage → Replace.

CAUTION:

- **The front fork leg has a built-in damper adjusting rod and a very sophisticated internal construction, which are particularly sensitive to foreign material.**
- **When disassembling and assembling the front fork leg, do not allow any foreign material to enter the front fork.**



4. Check:
   - O-ring (cap bolt) ①
   Damage/wear → Replace.

EB703703

ASSEMBLING THE FRONT FORK LEGS

The following procedure applies to both of the front fork legs.

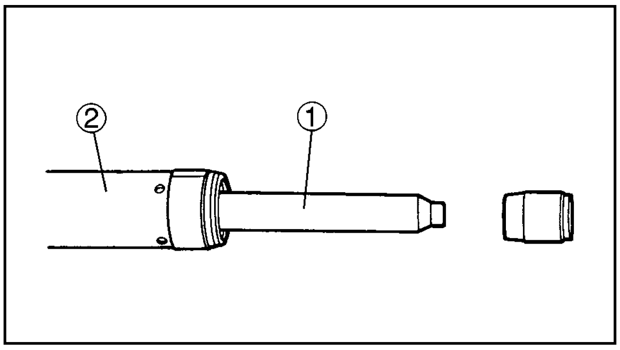
⚠ WARNING

- **Make sure that the oil levels both front fork legs are equal.**
- **Uneven oil levels can result in poor handling and a loss of stability.**

NOTE:

- When assembling the front fork leg, be sure to replace the following parts:
  - inner tube bushing
  - outer tube bushing
  - oil seal
  - dust seal
- Before assembling the front fork leg, make sure that all of the components are clean.

1. Install:
   - damper rod ①



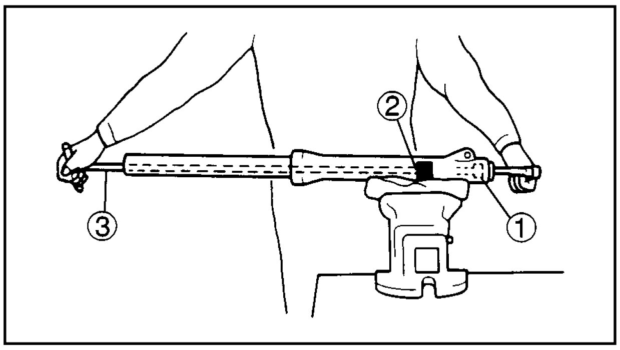
CAUTION:

Allow the damper rod to slide slowly down the inner tube ② until it protrudes from the bottom of the inner tube. Be careful not to damage the inner tube.

2. Lubricate:
   - inner tube's outer surface

Recommended lubricant
Yamaha fork and shock oil 10W or equivalent

3. Tighten:
   - damper rod bolt ①

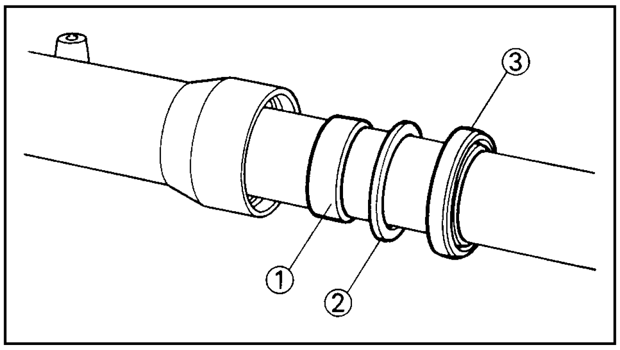


Damper rod bolt
30 Nm (3.0 m•kg)
LOCTITE®

NOTE:

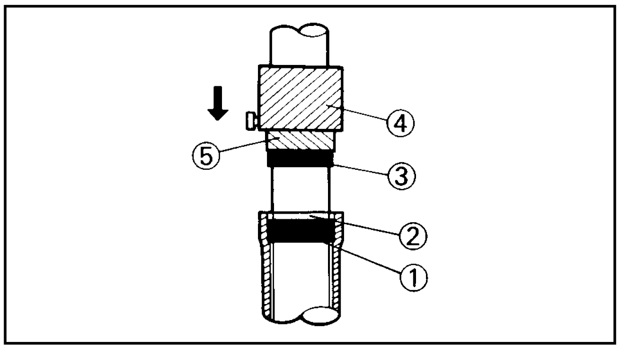
While holding the damper rod with the T-handle ③ and damper rod holder ②, tighten the damper rod bolt.

Damper rod holder (30 mm)
90890-01327
T-handle
90890-01326



4. Install:
    - outer tube bushing ①
    - oil seal spacer ②
    - oil seal ③ (with the fork seal driver weight ④ and adapter ⑤)

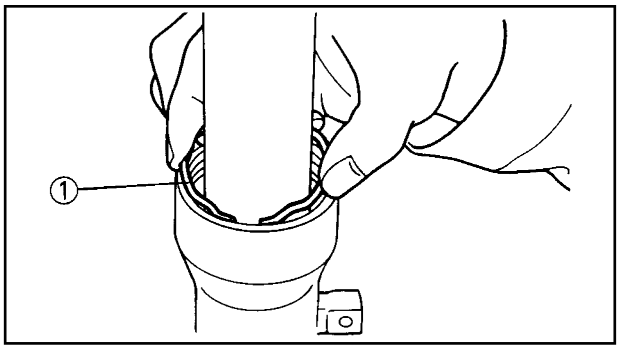
Fork seal driver weight **90890-01367** **Adapter** **90890-01374**



CAUTION:

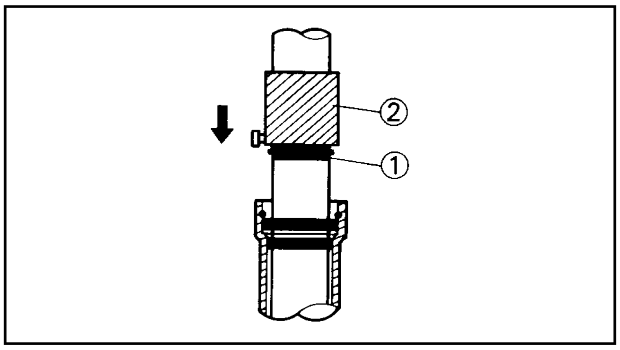
Make sure that the numbered side of the oil seal faces up.

NOTE:
- Before installing the oil seal, apply lithium soap base grease onto its lips.
- Lubricate the inner tube's outer surface.



5. Install:
    - oil seal clip ①

NOTE:
Adjust the oil seal clip so that it fits into the outer tube groove.



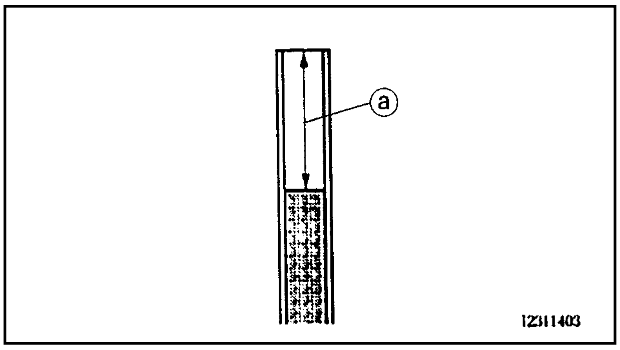
6. Install:
    - dust seal ①
      (with the fork seal driver weight ②)

7. Push down the inner tube into the outer tube.
8. Fill:
   - front fork leg
     (with the specified amount of the recommended fork oil)

	Quantity (each front fork leg) **0.525 L** **Recommended oil** **Yamaha fork and shock oil 10W or equivalent**

CAUTION:

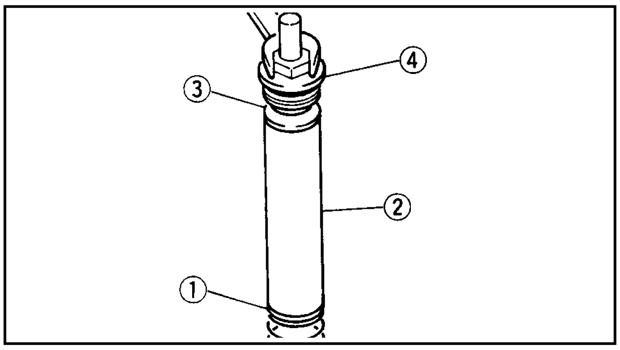
- **Be sure to use the recommended fork oil.**
- **Other oils may have an adverse effect on front fork performance.**
- **When disassembling and assembling the front fork leg, do not allow any foreign material to enter the front fork.**



9. After filling the front fork leg, slowly stroke the inner tube up and down (at least ten times) to distribute the fork oil.
10. Measure:
    - front fork leg oil level ⓐ
      Out of specification → Correct.

	Front fork leg oil level: **123 mm** **(from the top of the inner tube, with the inner tube fully compressed, and without the spring)**

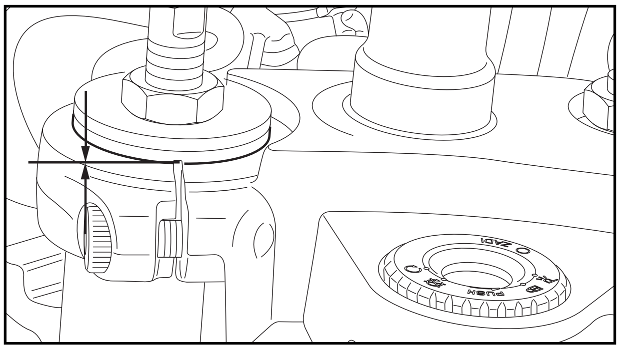
NOTE:
Hold the fork in an upright position.

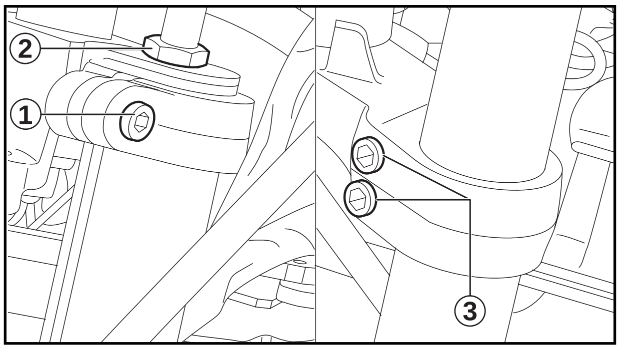


11. Install:
    - fork spring
    - spring seat ①
    - spacer ②
    - washer ③
    - cap bolt ④

NOTE

- Install the fork spring with its smaller pitch upword.
- Before installing the cap bolt, apply grease to the O-ring.
- Temporarily tighten the cap bolt.





EAS00662

INSTALLING THE FRONT FORK LEGS

The following procedure applies to both of the front fork legs.

1. Install:
   - front fork leg
     Temporarily tighten the upper and lower bracket pinch bolts.

NOTE:

Make sure that the inner fork tube is flush with the top of the upper bracket.

2. Tighten:
   - lower bracket pinch bolt ③
   - cap bolt ②
   - upper bracket pinch bolt ①

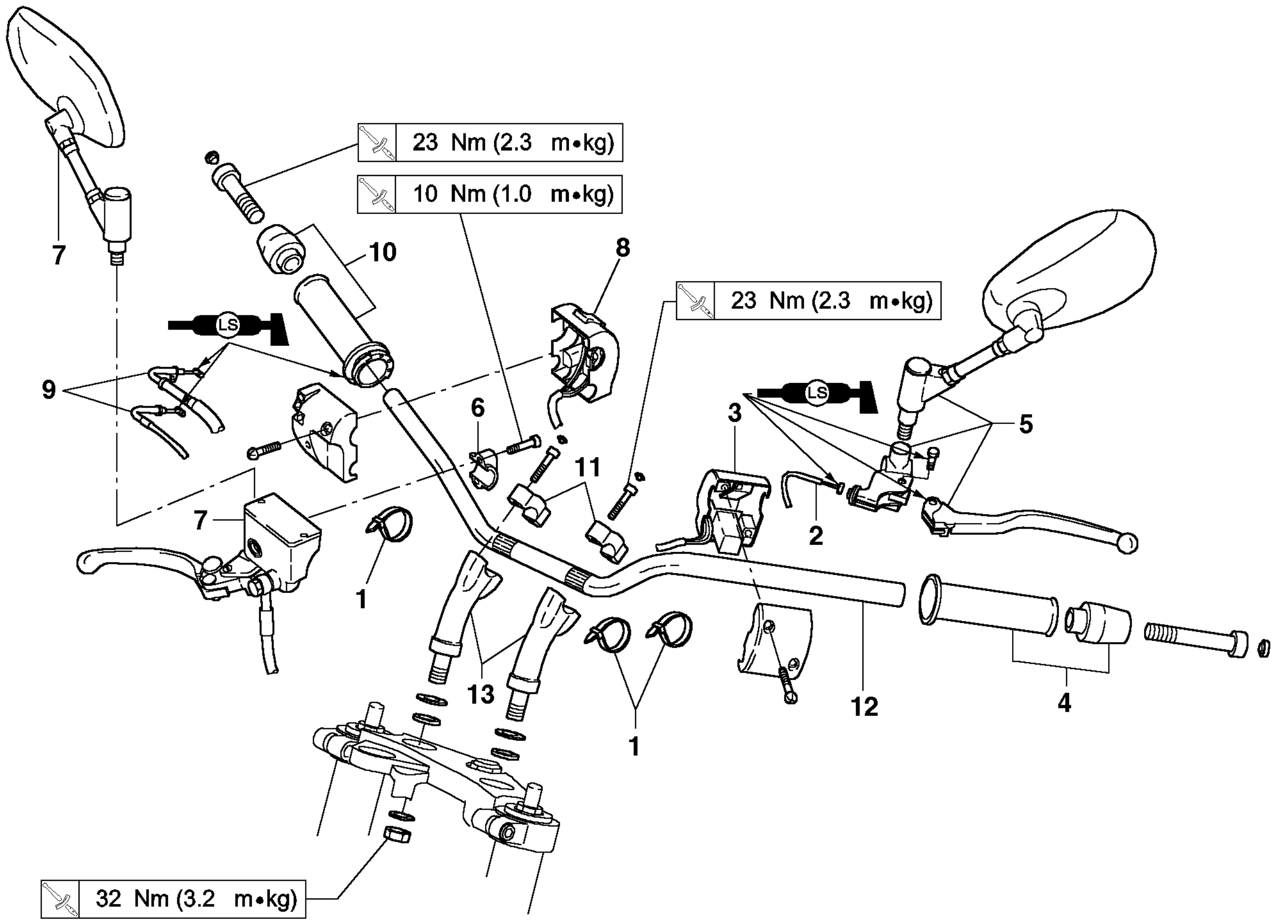
Lower bracket pinch bolt
25 Nm (2.5 m•kg)
Cap bolt
23 Nm (2.3 m•kg)
Upper bracket pinch bolt
25 Nm (2.5 m•kg)

⚠ WARNING

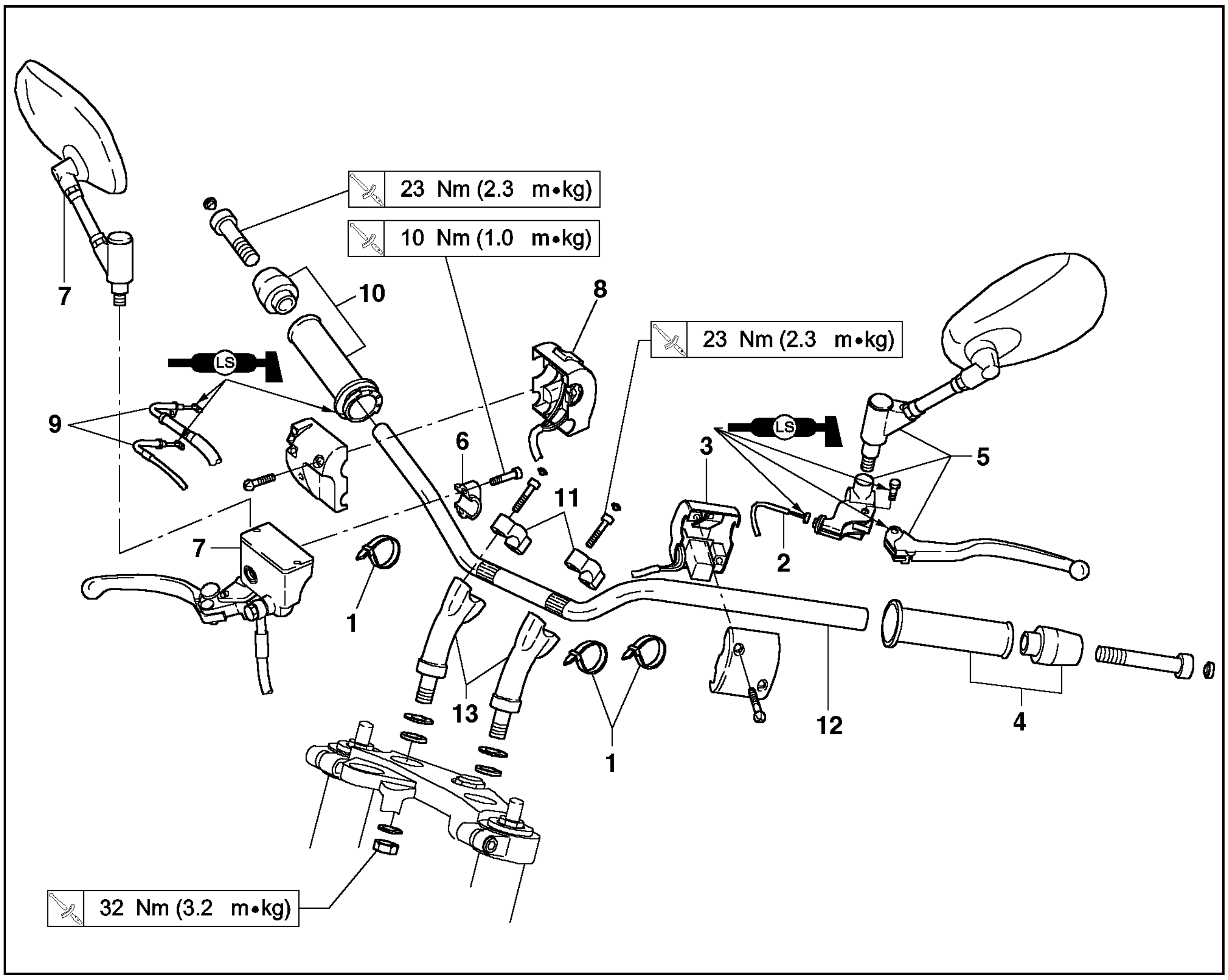
Make sure that the brake hoses are routed properly.

3. Set:
   - spring preload adjusting bolt (left and right)
     Refer to “ADJUSTING THE FRONT FORK LEGS” in Chapter 3.

HANDLEBAR



Order	Job name/Part name	Q'ty	Remarks
	Removing the handlebar		Remove the parts in the order listed. Stand the motorcycle on a level surface. **⚠ WARNING** **Securely support the motorcycle so that there is no danger of it falling over.**
1	Plastic locking ties	3	
2	Clutch cable	1	
3	Handlebar switch (left)	1	Refer to "INSTALLING THE HANDLEBAR".
4	Grip (left)	1	Refer to "REMOVING THE HANDLEBAR".
5	Clutch lever assembly/rear view mirror	1/1	Refer to "INSTALLING THE HANDLEBAR". (5–9)
6	Master cylinder bracket	1	
7	Master cylinder assembly/rear view mirror	1/1	
8	Handlebar switch (right)	1	
9	Throttle cables	2	



Order	Job name/Part name	Q'ty	Remarks
10	Throttle grip assembly	1	Refer to "INSTALLING THE HANDLEBAR".
11	Handlebar holders (upper)	2	
12	Handlebar	1	
13	Handlebar holders (lower)	2	
			For installation, reverse the removal procedure.

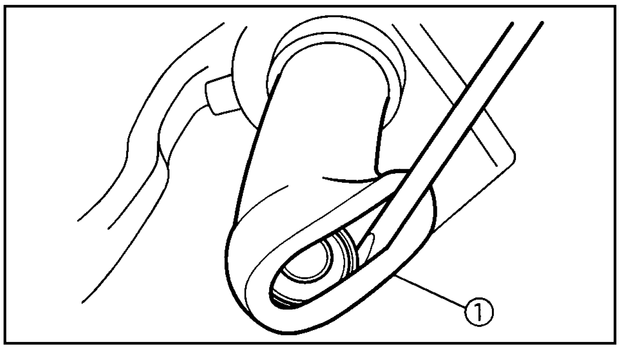
EAS00666

REMOVING THE HANDLEBAR

1. Stand the motorcycle on a level surface.

⚠ WARNING

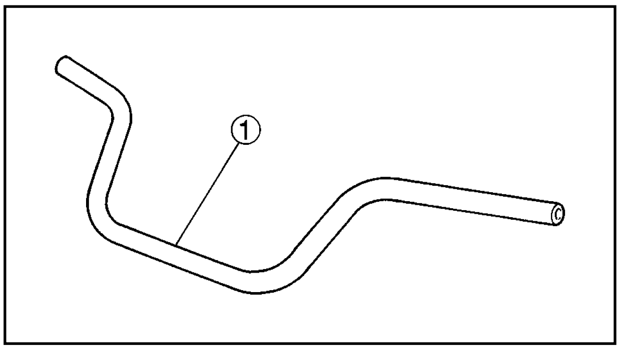
Securely support the motorcycle so that there is no danger of it falling over.



2. Remove:
   - handlebar grip (left) ①

NOTE:

Blow compressed air between the handlebar and the handlebar grip, and gradually push the grip off the handlebar.



EAS00668

CHECKING THE HANDLEBAR

1. Stand the motorcycle on a level surface.

⚠ WARNING

Securely support the motorcycle so that there is no danger of it falling over.

2. Check:
   - handlebar ①
     Bends/cracks/damage → Replace.

⚠ WARNING

Do not attempt to straighten a bent handlebar as this may dangerously weaken it.

3. Install:
   - handlebar grip

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a. Apply a light coat of rubber adhesive onto the left end of the handlebar.
b. Slide the handlebar grip over the left end of the handlebar.
c. Wipe off any excess rubber adhesive with a clean rag.

⚠ WARNING

Do not touch the handlebar grip until the rubber adhesive has fully dried.

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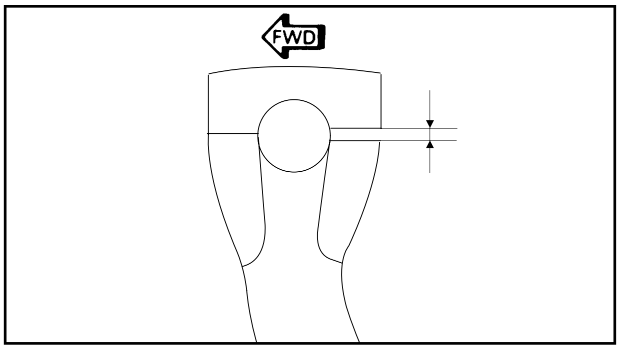
EASB0025

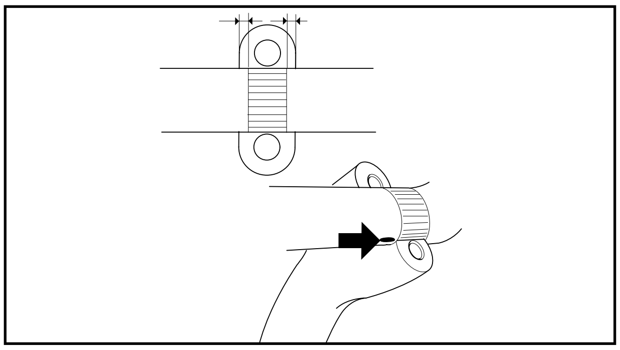
INSTALLING THE HANDLEBAR

1. Stand the motorcycle on a level surface.

⚠ WARNING

Securely support the motorcycle so that there is no danger of it falling over.





2. Install:
   - handlebar
   - upper handlebar holders

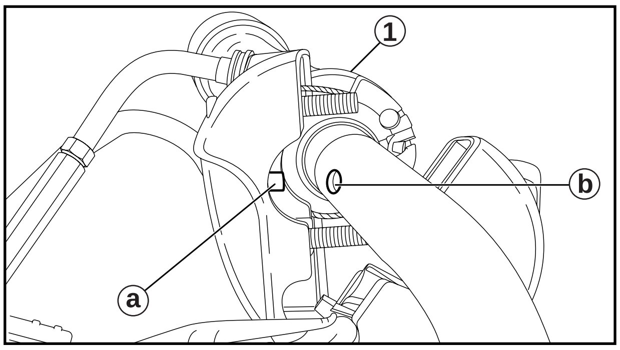
23 Nm (2.3 m•kg)

CAUTION:

- **First, tighten the bolts on the front side of the handlebar holder, then on the rear side.**
- **Turn the handlebar all the way to the left and right. If there is any contact with the fuel tank, adjust the handlebar position.**

NOTE:

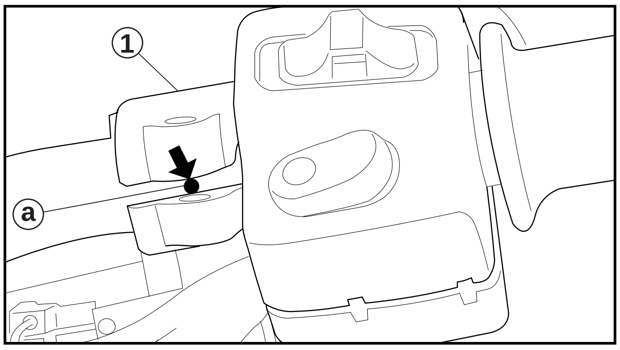
Align the match marks on the handlebar with the upper surface of the lower handlebar holders.



3. Install:
   - throttle grip ①
   - throttle cable

⚠ WARNING

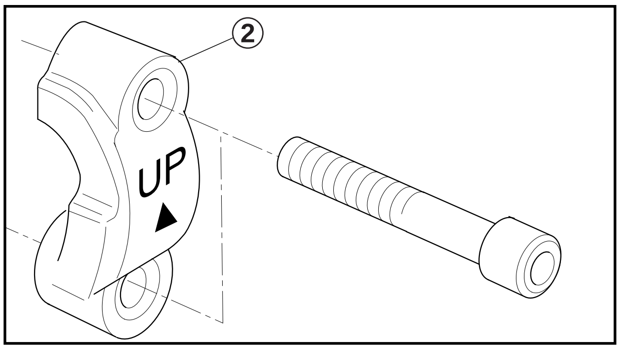
Make sure that the pin ⓐ on the throttle cable housing is aligned with the hole ⓑ in the handlebar.



4. Install:
   - master cylinder ①
     Refer to “FRONT AND REAR BRAKES”.

NOTE:

Align the slit in the brake lever holder with the punch mark ⓐ in the handlebar.

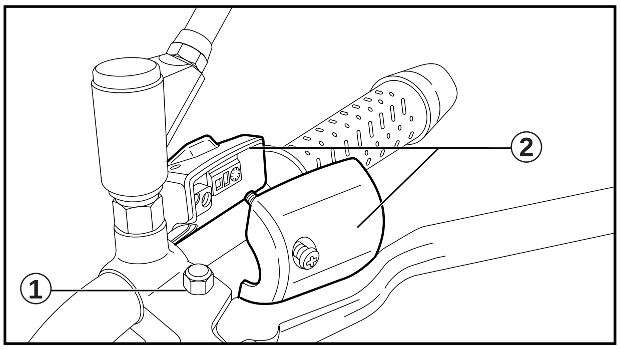


5. Install:
   - master cylinder holder ②

   10 Nm (1.0 m•kg)

NOTE:

Install the master cylinder holder ② with the mark "UP" facing up.



6. Install:
   - clutch lever holder ①

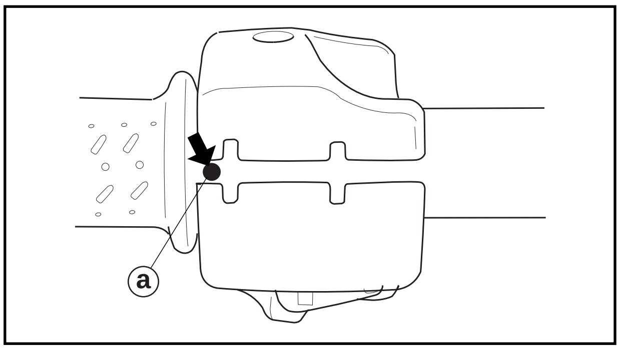
NOTE:

Align the slit in the clutch lever ⓐ holder with the punch mark in the handlebar.

7. Install:
   - left handlebar switch ②

NOTE:

Aligh the matching surface on the handlebar switches with the punch mark ⓐ on the handlebar.



8. Install:
   - clutch cable
9. Connect:
   - clutch switch coupler

NOTE:
Apply a thin coat of lithium soap base grease onto the end of the clutch cable.

10. Adjust:
    • clutch cable free play
      Refer to “ADJUSTING THE CLUTCH CABLE FREE PLAY” in Chapter 3.

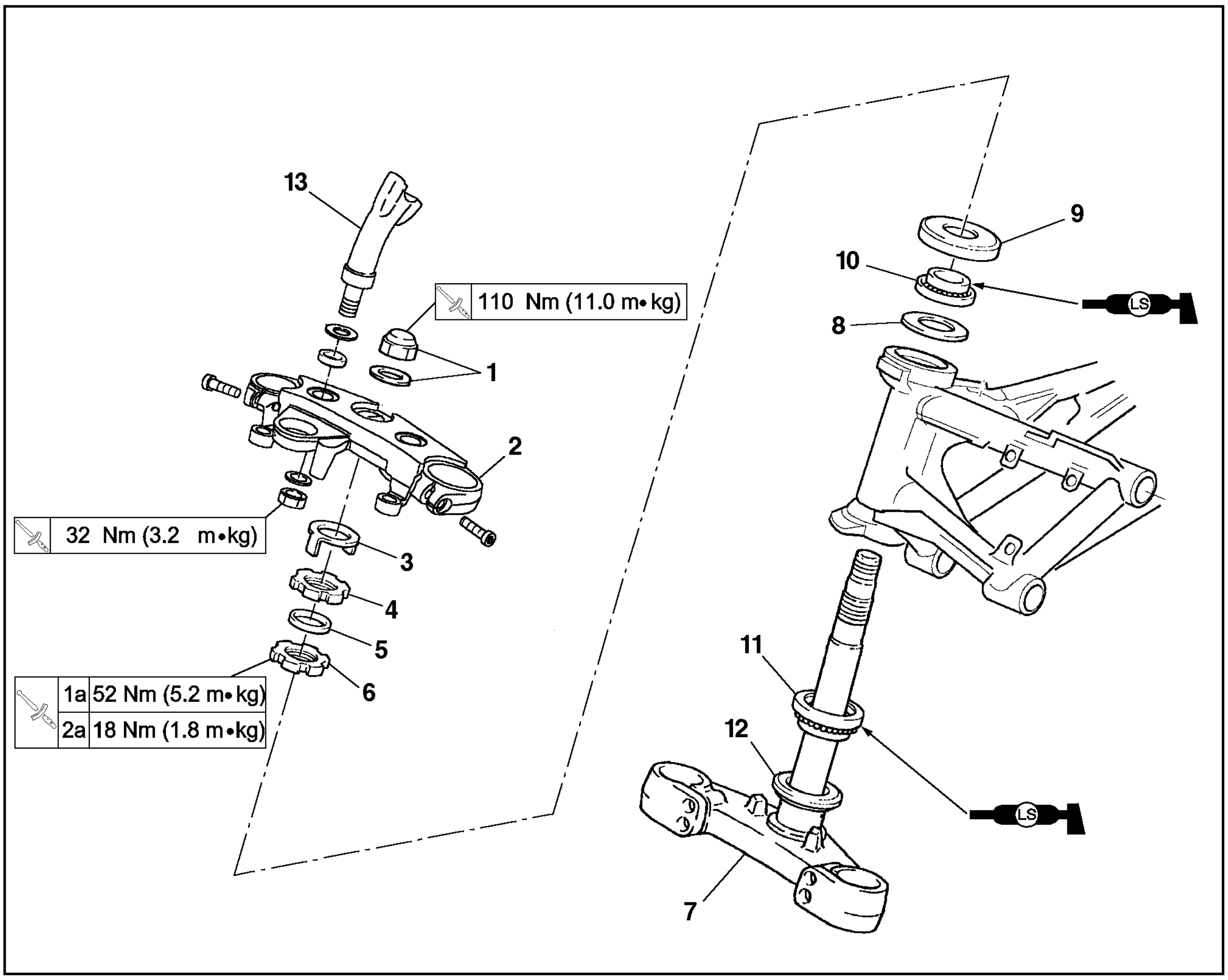
Clutch cable free play (at the end of the clutch lever)
5 ~ 10 mm

11. Adjust:
    • throttle cable free play
      Refer to “ADJUSTING THE THROTTLE CABLE FREE PLAY” in Chapter 3.

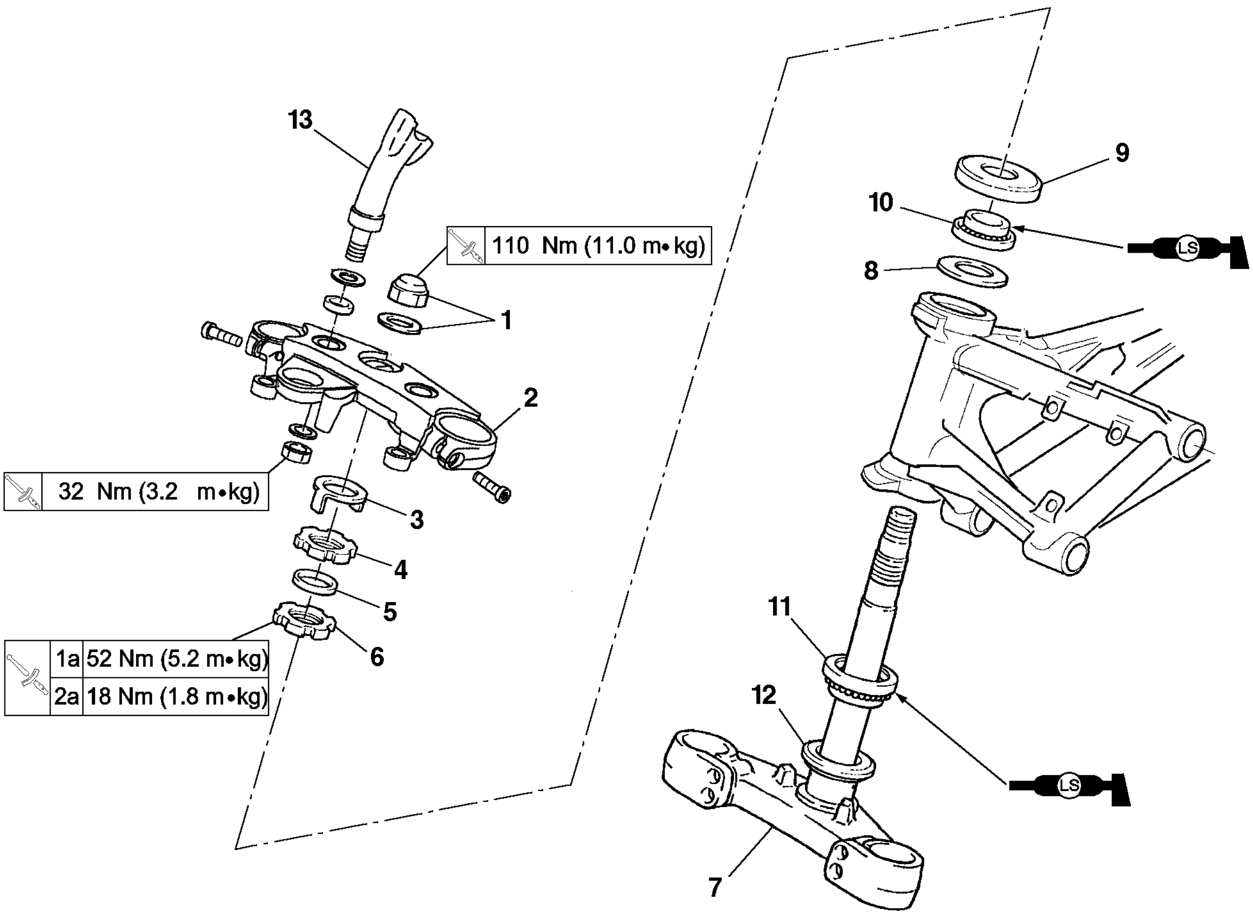
Throttle cable free play (at the flange of the throttle grip)
3 ~ 5 mm

STEERING HEAD

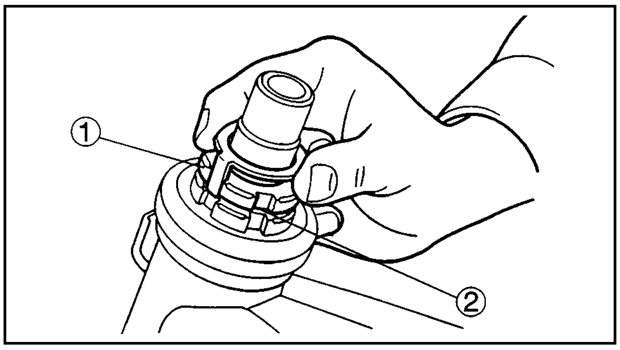
LOWER BRACKET



Order	Job name/Part name	Q'ty	Remarks
	Removing the lower bracket		Remove the parts in the order listed.
	Front wheel		Refer to "FRONT WHEEL AND BRAKE DISCS".
	Front fork legs		Refer to "FRONT FORK".
	Handlebar		Refer to "HANDLEBAR".
1	Crown nut/washer plate	1/1	Refer to "INSTALLING THE STEERING HEAD".
2	Upper bracket	1	
3	Special washer	1	
4	Upper ring nut	1	Refer to "REMOVING THE LOWER BRACKET/INSTALLING THE STEERING HEAD".
5	Rubber seal	1	
6	Lower ring nut	1	
7	Lower bracket	1	
8	Rubber washer	1	
9	Bearing cover	1	
10	Bearing	1	



Order	Job name/Part name	Q'ty	Remarks
11	Bearing	1	
12	Dust seal	1	
13	Lower handlebar holder	2	
			For installation, reverse the removal procedure.



EAS00679

REMOVING THE LOWER BRACKET

1. Stand the motorcycle on a level surface.

⚠ WARNING

Securely support the motorcycle so that there is no danger of it falling over.

2. Remove:
   - upper ring nut ①
   - lower ring nut ②

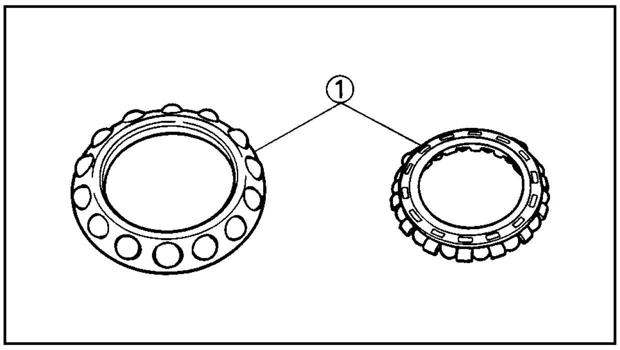
NOTE:

Hold the lower ring nut with the exhaust and steering nut wrench, then remove the upper ring nut with the ring nut wrench.

	Exhaust and steering nut wrench **90890-01268** **Ring nut wrench** **90890-01403**

⚠ WARNING

Securely support the lower bracket so that there is no danger of it falling.



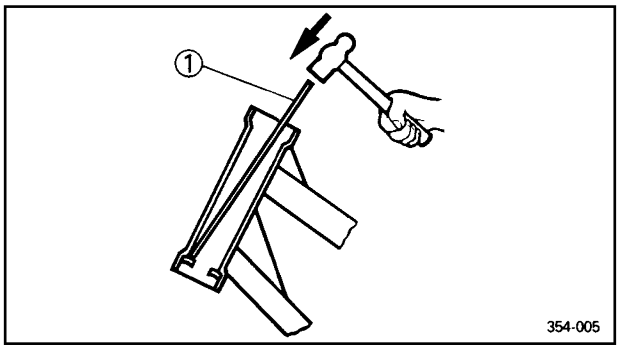
EAS00682

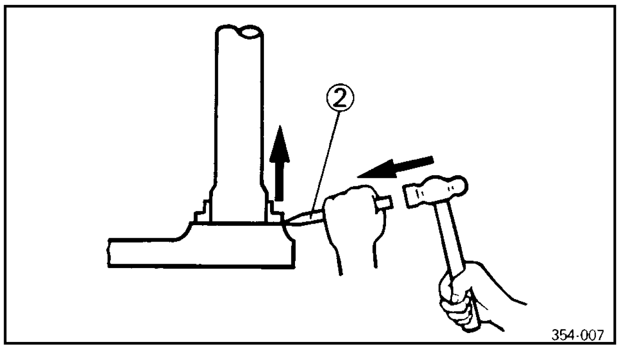
CHECKING THE STEERING HEAD

1. Wash:
   - bearings
   - bearing races

	Recommended cleaning solvent **Kerosine**

2. Check:
   - bearings ①
     Damage/pitting → Replace.
3. Replace:
   - bearings
   - bearing races





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a. Remove the bearing races from the steering head pipe with a long rod ① and hammer.
b. Remove the bearing race from the lower bracket with a floor chisel ② and hammer.
c. Install a new rubber seal and new bearing races.

CAUTION:

If the bearing race is not installed properly, the steering head pipe could be damaged.

NOTE:
- Always replace the bearings and bearing races as a set.
- Whenever the steering head is disassembled, replace the rubber seal.

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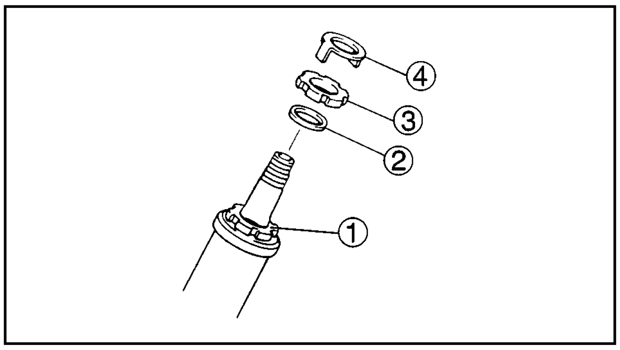
4. Check:
   - upper bracket
   - lower bracket
     (along with the steering stem)
     Bends/cracks/damage → Replace.

EAS00683

INSTALLING THE STEERING HEAD

1. Lubricate:
   - upper bearing
   - lower bearing
   - bearing races

	Recommended lubricant **Lithium soap base grease**



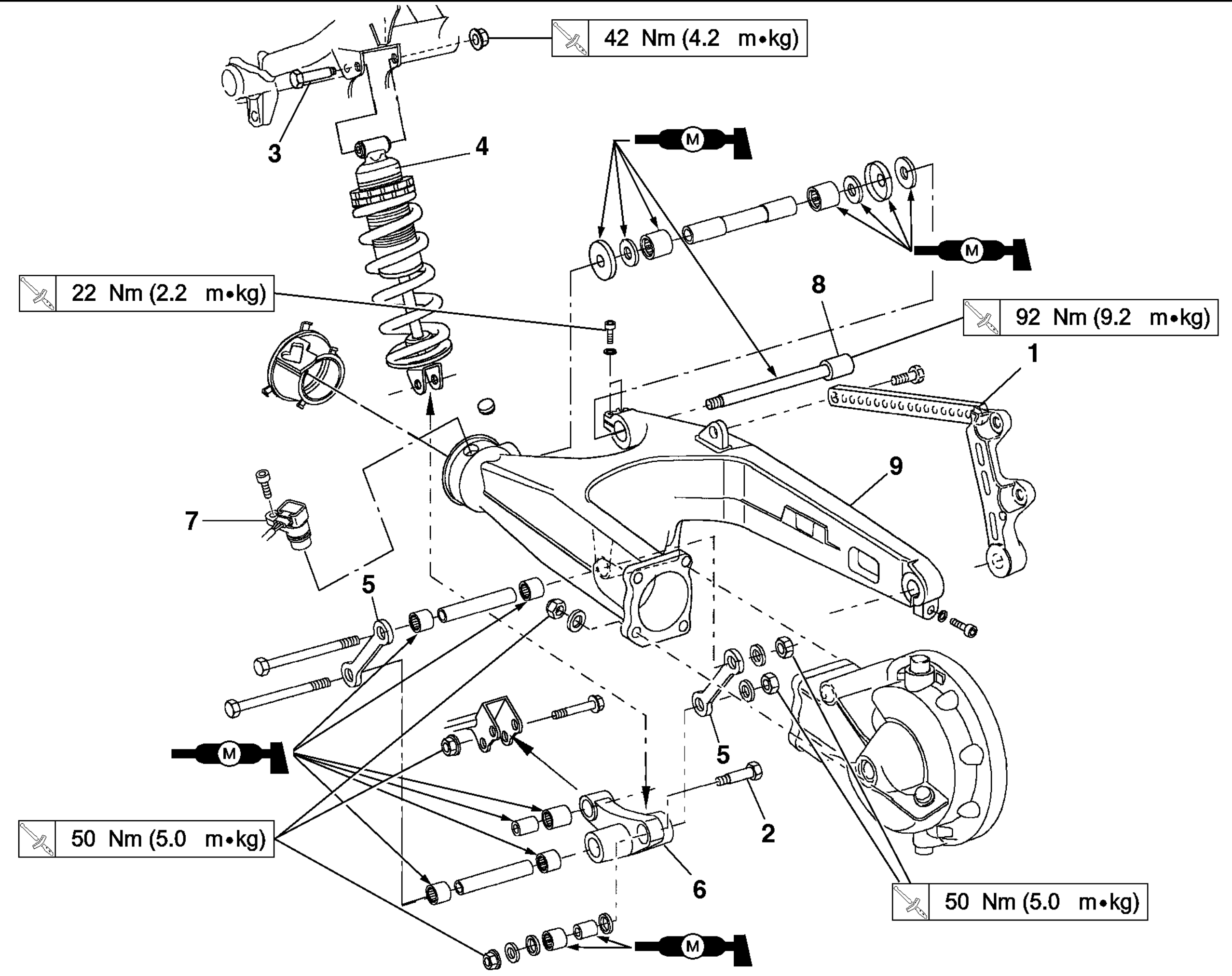
2. Install:
   - lower ring nut ①
   - rubber washer ②
   - upper ring nut ③
   - lock washer ④
     Refer to “CHECKING AND ADJUSTING THE STEERING HEAD” in Chapter 3.
3. Install:
   - upper bracket
   - steering stem nut

NOTE:
Temporarily tighten the steering stem nut.

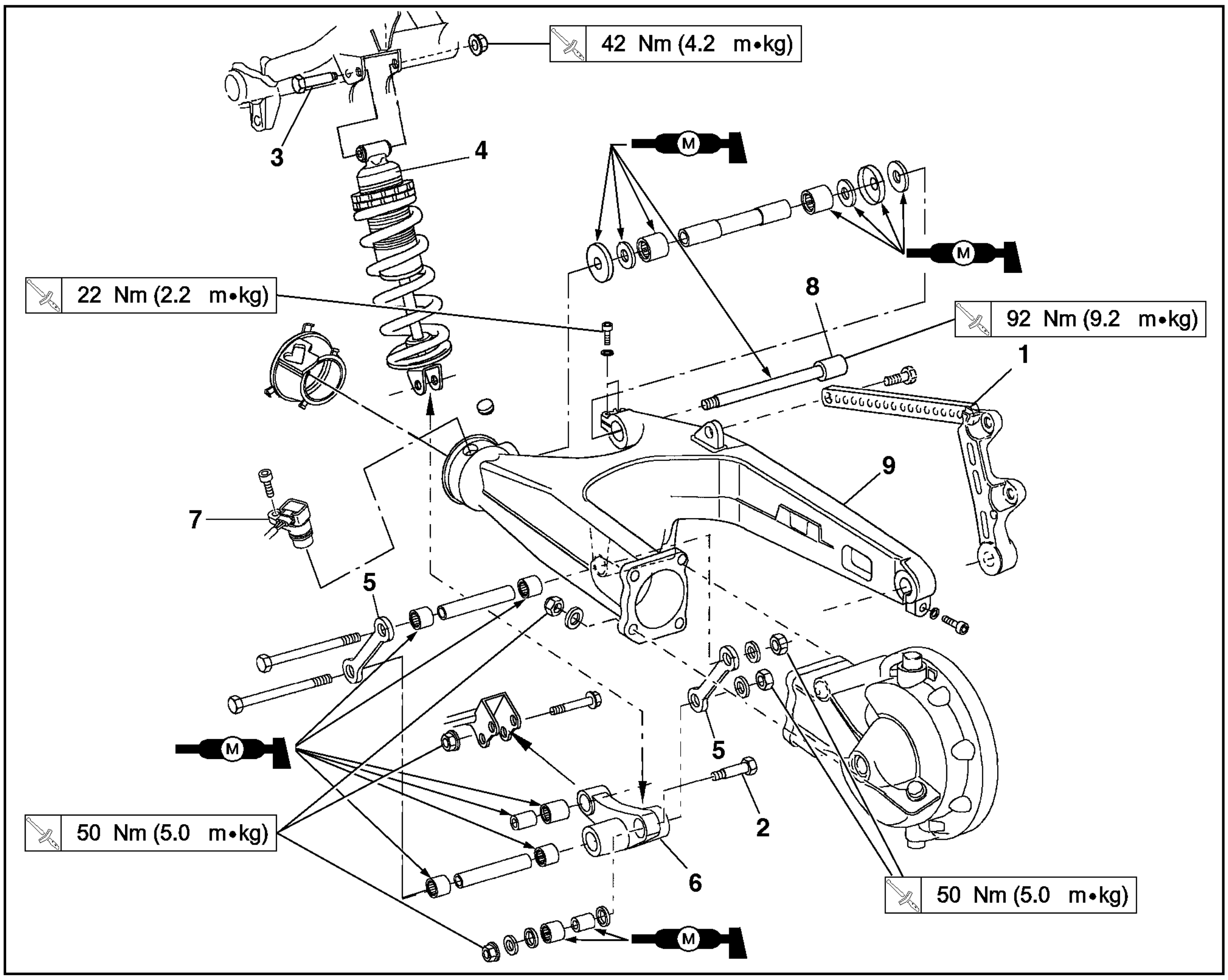
4. Install:
   - front fork legs
     Refer to “FRONT FORK”.

NOTE:
Temporarily tighten the upper and lower bracket pinch bolts.

REAR SHOCK ABSORBER AND SWINGARM



Order	Job name/Part name	Q'ty	Remarks
	Removing the rear shock absorber and swingarm		Remove the parts in order listed.
			Stand the motorcycle on a level surface. Place a suitable stand under the engine.
			WARNING **Securely support the motorcycle so that there is no danger of it falling over.**
	Seat Side covers		Refer to "SEAT, SIDE COVERS AND FUEL TANK" in Chapter 3.
	Muffler assembly (exhaust system)		Refer to "REMOVING THE ENGINE".
	Rear wheel		Refer to "REAR WHEEL AND BRAKE DISC".
	Rear brake caliper		Refer to "REAR BRAKE CALIPER".



Order	Job name/Part name	Q'ty	Remarks
	Rear master cylinder		It is not necessary to disconnect the brake hose. Refer to "REAR BRAKE MASTER CYLINDER".
	Rear brake pedal		
	Main footrest (right and left)		
	Main footrest cover (right)		
	Passenger footrest holder (right and left)		
1	Brake caliper tension bar	1	
2	Rear shock absorber lower bolt	1	
3	Rear shock absorber upper bolt	1	
4	Rear shock absorber	1	
5	Connecting arms	2	
6	Relay arm	1	
7	Speed sensor	1	
8	Pivot shaft	1	
9	Swingarm	1	
			For installation, reverse the removal procedure.

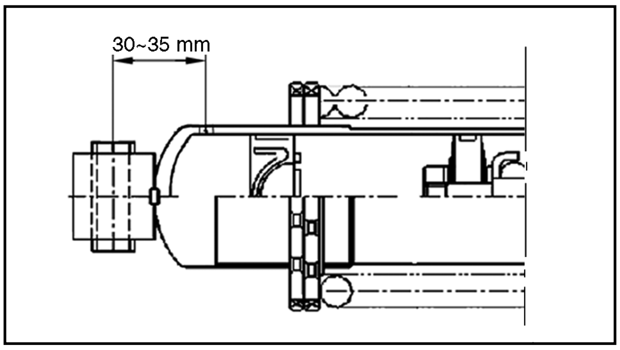
EAS00687

HANDLING THE REAR SHOCK ABSORBER AND GAS CYLINDER

⚠ WARNING

This rear shock absorber and gas cylinder contain highly compressed nitrogen gas.

- **Before handling the rear shock absorber or gas cylinder, read and make sure you understand the following information. The manufacturer cannot be held responsible for property damage or personal injury that may result from improper handling of the rear shock absorber and gas cylinder.**
- **Do not tamper or attempt to open the rear shock absorber or gas cylinder.**
- **Do not subject the rear shock absorber or gas cylinder to an open flame or any other source of high heat. High heat can cause an explosion due to excessive gas pressure.**
- **Do not deform or damage the rear shock absorber or gas cylinder in any way. If the rear shock absorber, gas cylinder or both are damaged, damping performance will suffer.**



EAS00689

DISPOSING OF A REAR SHOCK ABSORBER AND GAS CYLINDER

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a. Gas pressure must be released before disposing of a rear shock absorber and gas cylinder.
   To release the gas pressure, drill a 2 ~ 3 mm hole through the gas cylinder at a point 30 – 35 mm from its end as shown.

⚠ WARNING

Wear eye protection to prevent eye damage from released gas or metal chips.

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EASB0026

REMOVING THE REAR SHOCK ABSORBER ASSEMBLY

1. Stand the motorcycle on a level surface.

⚠ WARNING

Securely support the motorcycle so that there is no danger of it falling over.

NOTE:

Place the motorcycle on a suitable stand so that the rear wheel is elevated.

2. Remove:
   - rear shock absorber assembly upper bolt
   - rear shock absorber assembly lower bolt

NOTE:

While removing the rear shock absorber assembly upper bolt, hold the swingarm so that it does not drop down.

3. Remove:
   - rear shock absorber

EASB0027

REMOVING THE SWINGARM

1. Stand the motorcycle on a level surface.

⚠ WARNING

Securely support the motorcycle so that there is no danger of it falling over.

NOTE:

Place the motorcycle on a suitable stand so that the rear wheel is elevated.

2. Remove:
   - rear shock absorber
3. Check:
   - swingarm side play
   - swingarm vertical movement

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a. Check the tightening torque of the swingarm pivot bolts.

Swingarm pivot bolt
92 Nm (9.2 m•kg)

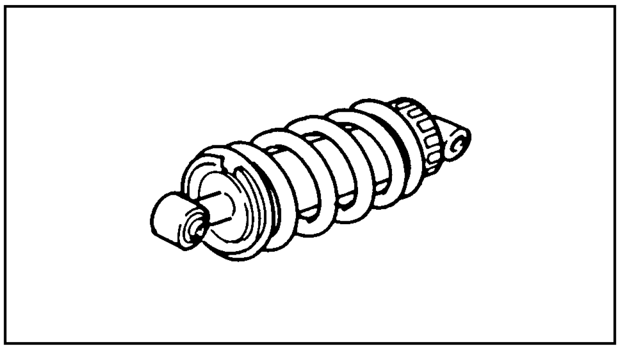
b. Check the swingarm side play by moving the swingarm from side to side.

c. If the swingarm side play is out of specification, check the spacers and bearings.

Swingarm side play (at the end of the swingarm)
0 mm

d. Check the swingarm vertical movement by moving the swingarm up and down. If swingarm vertical movement is not smooth or if there is binding, check the spacers and bearings.

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EAS00696

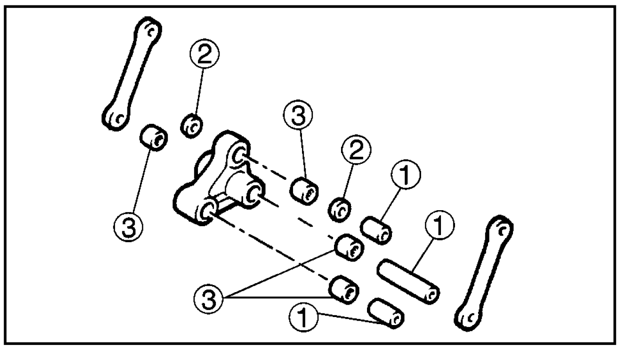
CHECKING THE REAR SHOCK ABSORBER ASSEMBLY AND GAS CYLINDER

1. Check:
   - rear shock absorber rod
     Bends/damage → Replace the rear shock absorber assembly.
   - rear shock absorber
     Gas leaks/oil leaks → Replace the rear shock absorber assembly.
   - spring
     Damage/wear → Replace the rear shock absorber assembly.
   - gas cylinder
     Damage/gas leaks → Replace.
   - bushings
     Damage/wear → Replace.
   - dust seals
     Damage/wear → Replace.
   - bolts
     Bends/damage/wear → Replace.

EAS00708

CHECKING THE SWINGARM

1. Check:
   - swingarm
     Bends/cracks/damage → Replace.
2. Check:
   - pivot shaft
     Damage/wear → Replace.
3. Check:
   - collars ①
   - oil seals ②
   - bearings ③
     Damage/wear → Replace.



EASB0028

INSTALLING THE REAR SHOCK ABSORBER ASSEMBLY

1. Install:
   - swingarm
     Refer to “INSTALLING THE SWINGARM”.
2. Lubricate:
   - spacers
   - bearings

	Recommended lubricant **Molybdenum disulfide grease**

3. Install:
   - rear shock absorber assembly

	Rear shock absorber assembly: **Upper nut** **42 Nm (4.2 m•kg)** **Lower nut** **50 Nm (5.0 m•kg)** **Relay-arm-to-frame-nut** **50 Nm (5.0 m•kg)**

NOTE:

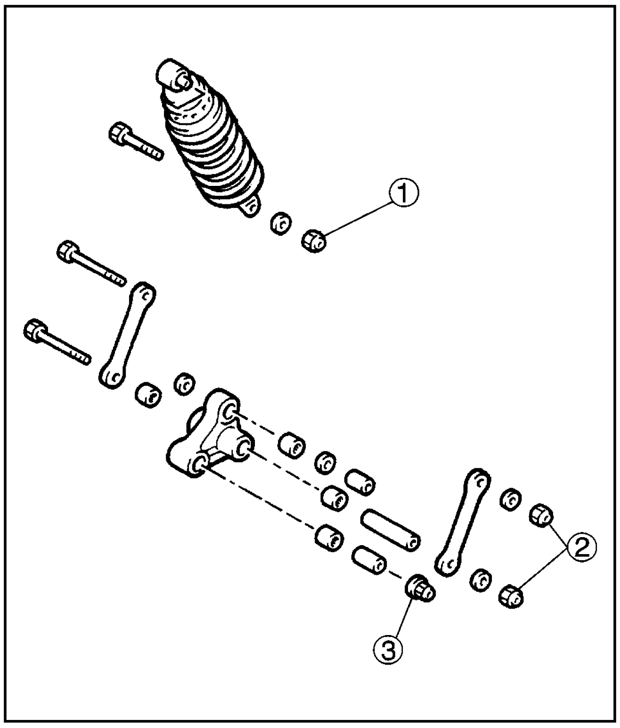
When installing the rear shock absorber assembly, lift up the swingarm.

EAS00712

INSTALLING THE SWINGARM

1. Lubricate:
   - bearings
   - spacers
   - oil seals

	Recommended lubricant **Molybdenum disulfide grease**



2. Install:
   - relay arm
   - left connecting arm
   - right connecting arm

	Rear-shock-absorber-assembly: **Lower nut ①** **50 Nm (5.0 m•kg)** **Connecting arm nuts ②** **50 Nm (5.0 m•kg)** **Relay-arm-to-frame-nut ③** **50 Nm (5.0 m•kg)**

3. Install:
   - rear shock absorber
     Reter to "INSTALLING THE REAR SHOCK ABSORBER ASSEMBLY".
4. Install:
   - rear wheel
     Refer to "REAR WHEEL AND BRAKE DISC".

SHAFT DRIVE

EAS00715

TROUBLESHOOTING

The following conditions may indicate damaged shaft drive components:

A	Symptoms	B	Possible causes
	1. A pronounced hesitation or jerky movement during acceleration, deceleration, or sustained speeds (not to be confused with engine surging or transmission related movements). 2. A rolling "rumble" noticeable at low speeds, a high-pitched whine, or a "clunk" from a shaft drive component or vicinity of the shaft drive. 3. The shaft drive is locked up or no power is transmitted from the engine to the rear wheel.		A. Bearing damage B. Improper gear lash C. Damaged gear teeth D. Broken drive shaft E. Broken gear teeth F. Seizure due to lack of lubrication G. Small foreign objects lodged between moving parts. Small foreign objects lodged between moving parts.

NOTE:

Causes A, B and C may be extremely difficult to diagnose. The symptoms are quite subtle and difficult to distinguish from normal operating noises. If there is reason to believe these components are damaged, remove them for individual inspection.

Inspection notes

1. Investigate any unusual noises.

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The following noises may indicate a mechanical defect:

a. A rolling "rumble" during coasting, acceleration, or deceleration, (increases with the rear wheel speed, but does not increase with higher engine or transmission speeds).
   Diagnosis: Possible wheel bearing damage.
b. A whining noise that varies with acceleration and deceleration.
   Diagnosis: Possible incorrect reassembly or too little gear lash.

⚠ WARNING

Insufficient gear lash is extremely destructive to the gear teeth. If a test ride, following reassembly, indicates these symptoms, stop riding immediately to minimize gear damage.

c. A slight "clunk" evident at low speed operation (not to be confused with normal motorcycle operation).
   Diagnosis: Possible broken gear teeth.

⚠ WARNING

Stop riding immediately if broken gear teeth are suspected. This condition could result in the shaft drive assembly locking up, causing a loss of control and possible injury to the rider.

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EAS00716

Troubleshooting chart

When causes A and B shown in the chart at the beginning of the “TROUBLESHOOTING” section exist, check the following points:

Place the motorcycle on a suitable stand so that the front wheel is elevated and then spin the front wheel. Is the wheel bearing damaged?

YES → Replace the wheel bearing.
Refer to “FRONT WHEEL AND BRAKE DISC”.

NO ↓

Place the motorcycle on a suitable stand so that the rear wheel is elevated and then spin the rear wheel. Is the wheel bearing damaged?

NO → Rear wheel bearings and shaft drive bearings are probably not damaged.
Repeat the test or remove and check the components.

YES ↓

Remove the rear wheel. Is the wheel bearing damaged?

YES → Replace the rear wheel bearing.
Refer to “REAR WHEEL AND BRAKE DISC”.

NO ↓

Remove and inspect the drive shaft components.

EAS00717

CHECKING THE FINAL DRIVE OIL FOR CONTAMINATION AND INSPECTING THE SHAFT DRIVE FOR LEAKS

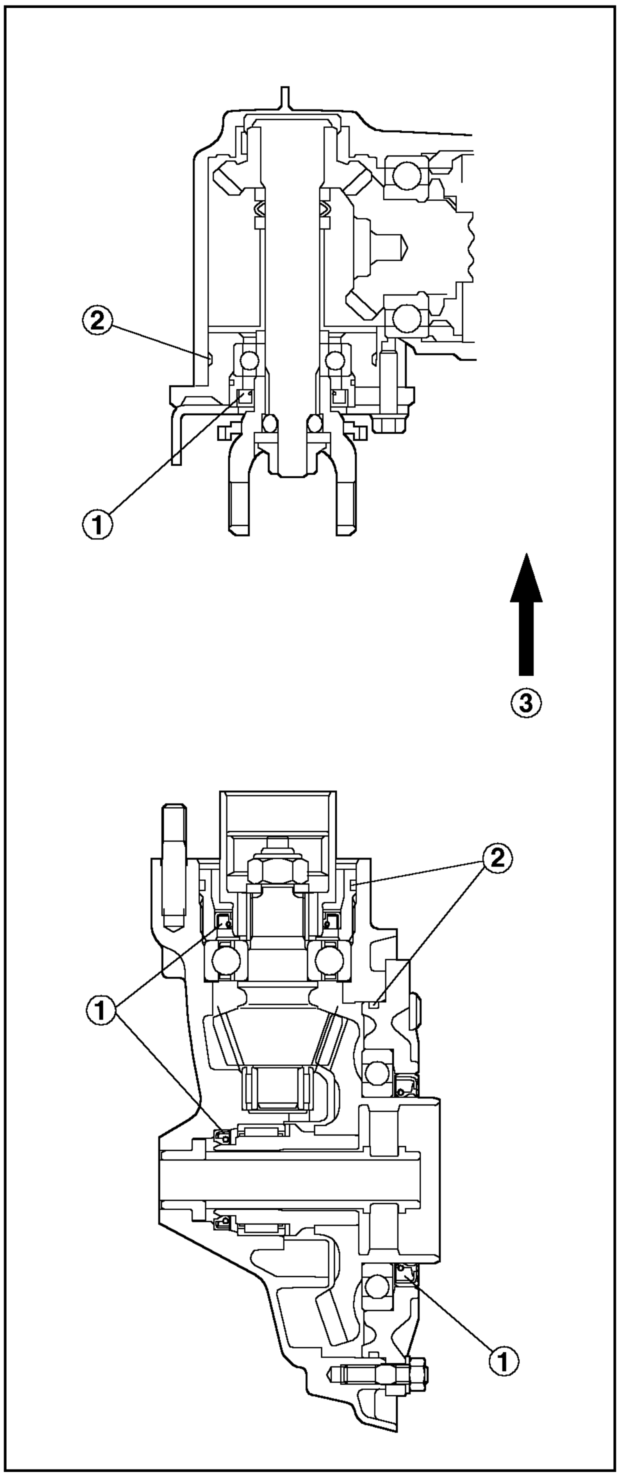
1. Drain:
   - final drive oil (from the final drive housing)
     Refer to “CHANGING THE FINAL DRIVE OIL” in Chapter 3.
2. Check:
   - final drive oil
     Large amount of metal particles → Check for bearing seizure.

NOTE:
A small amount of metal particles in the final drive oil is normal.

3. Check:
   - shaft drive housing (for oil leaks)

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a. Thoroughly clean the entire motorcycle and then completely dry it.
b. Apply a leak-locating compound or dry powder spray to the shaft drive.
c. Test ride the motorcycle long enough to locate a leak.
   Oil leak → Repair or replace the faulty part(-s).



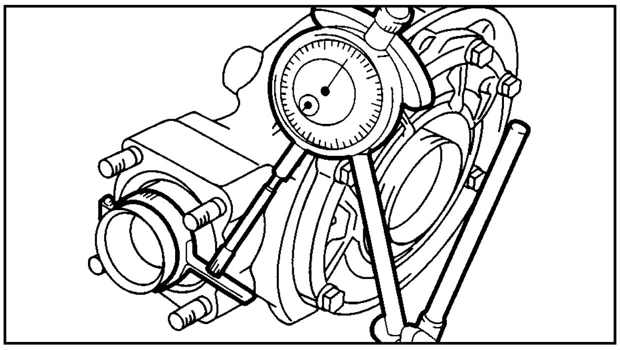
① Oil seal
② O-ring
③ Forward

NOTE:
- What may appear to be an oil leak on a new or fairly new motorcycle, may result from the application of a rust preventive coating or excessive seal lubrication.
- Always clean the motorcycle and recheck the area where the leak is thought to originate from.

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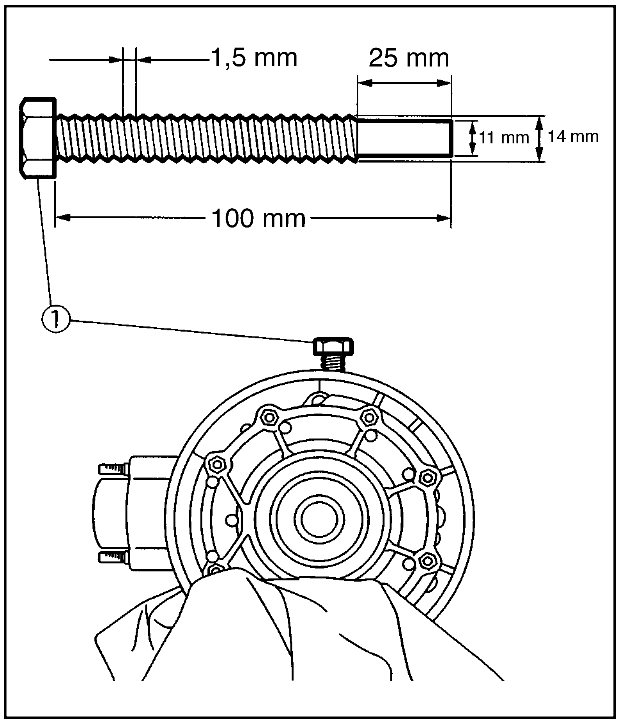
EAS00719

MEASURING THE RING GEAR BACKLASH



1. Secure the final drive assembly in a vice.
2. Remove:
   - final drive oil drain bolt
3. Drain:
   - final drive oil
     (from the final drive assembly)
4. Measure:
   - ring gear backlash
     Out of specification → Adjust.

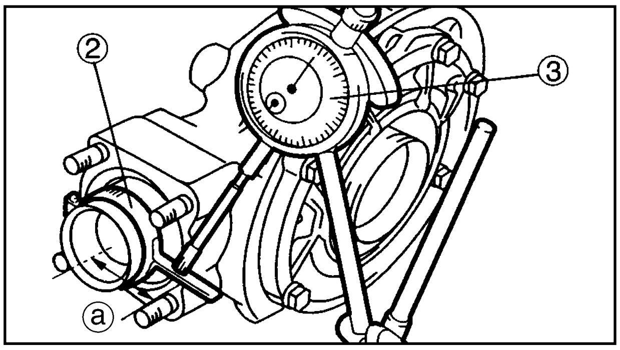
	Ring gear backlash **0.1 ~ 0.2 mm**



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a. Install a bolt ① of the specified size, into the final drive oil filler hole.
b. Finger tighten the bolt until it stops the ring gear from moving.

NOTE:
Do not overtighten the bolt.



c. Install the final gear backlash band ② and dial gauge ③.

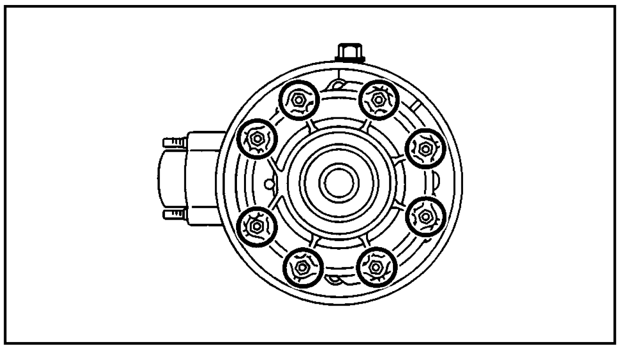
	Final gear backlash band **90890-01230**

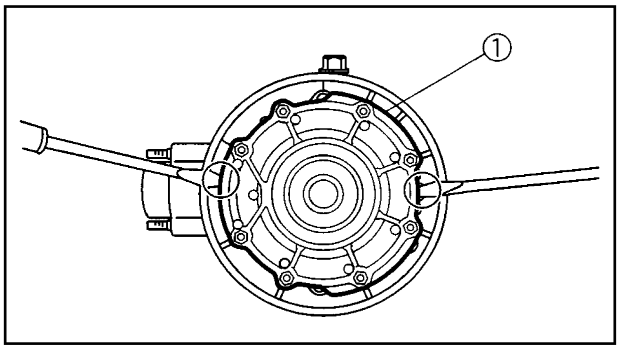
ⓐ Dial-gauge-plunger contact point: 54.5 mm

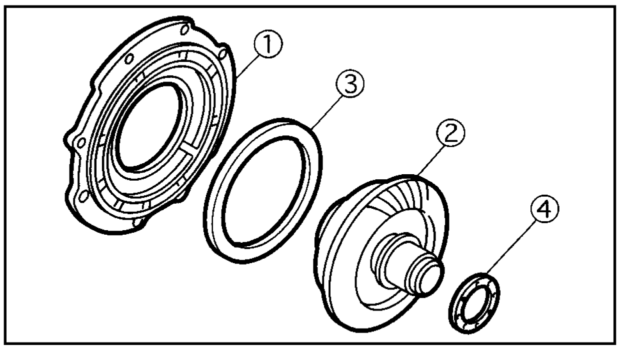
d. Gently rotate the gear coupling from engagement to engagement.
e. Record the reading on the dial gauge.
f. Remove the dial gauge, special tool, and bolt.

g. Rotate the final drive pinion gear 90°
h. Reinstall the bolt, special tool, and dial gauge.
i. Repeat steps (d) to (h) three more times (for a total of four measurements).
j. If any of the readings are over specification, adjust the ring gear backlash.

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EAS00720

ADJUSTING THE RING GEAR BACKLASH

1. Remove:
   - ring gear bearing housing nuts
   - ring gear bearing housing bolts

NOTE:
Working in a crisscross pattern, loosen each nut 1/4 of a turn. After all of the nuts are fully loosened, remove them and the bolts.

2. Remove:
   - ring gear bearing housing ①
   - ring gear ②
   - ring gear shim(-s) ③
   - thrust washer ④
3. Adjust:
   - ring gear backlash

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a. Use the following chart to select the suitable shim(-s) and thrust washer.

Thinner shim	**Ring gear backlash is increased.**
Thicker shim	**Ring gear backlash is decreased.**

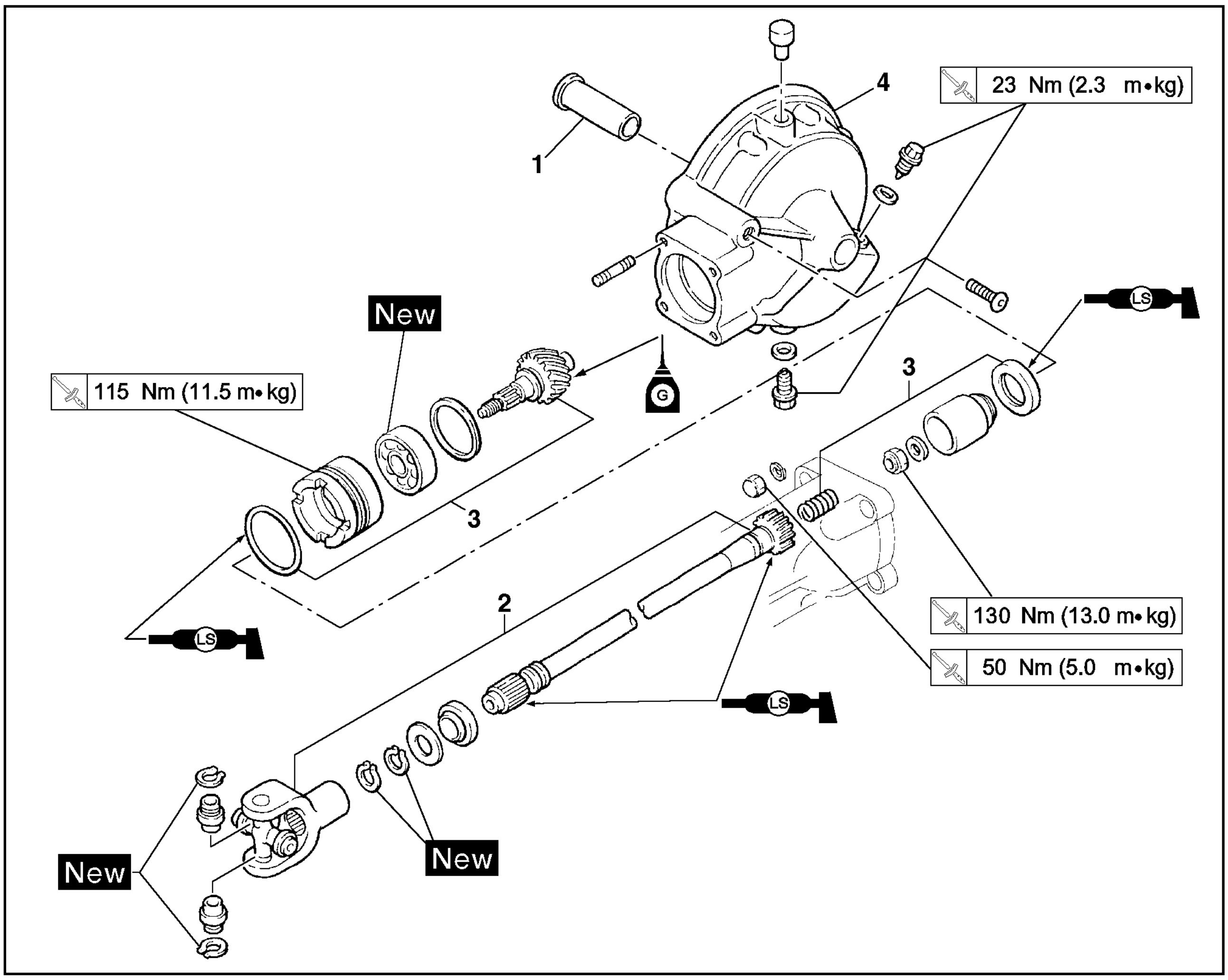
b. If it is necessary to increase the ring gear backlash by more than 0.2 mm, reduce the thrust washer thickness by 0.2 mm for every 0.2 mm increase of ring gear shim thickness.
c. If it is necessary to reduce the ring gear backlash by more than 0.2 mm, increase the thrust washer thickness by 0.2 mm for every 0.2 mm decrease of ring gear shim thickness.

Rig gear shims	
Thickness (mm)	**0.25, 0.30, 0.40, 0.50**

Thrust washers	
Thickness (mm)	**1.2, 1.4, 1.6, 1.8, 2.0**

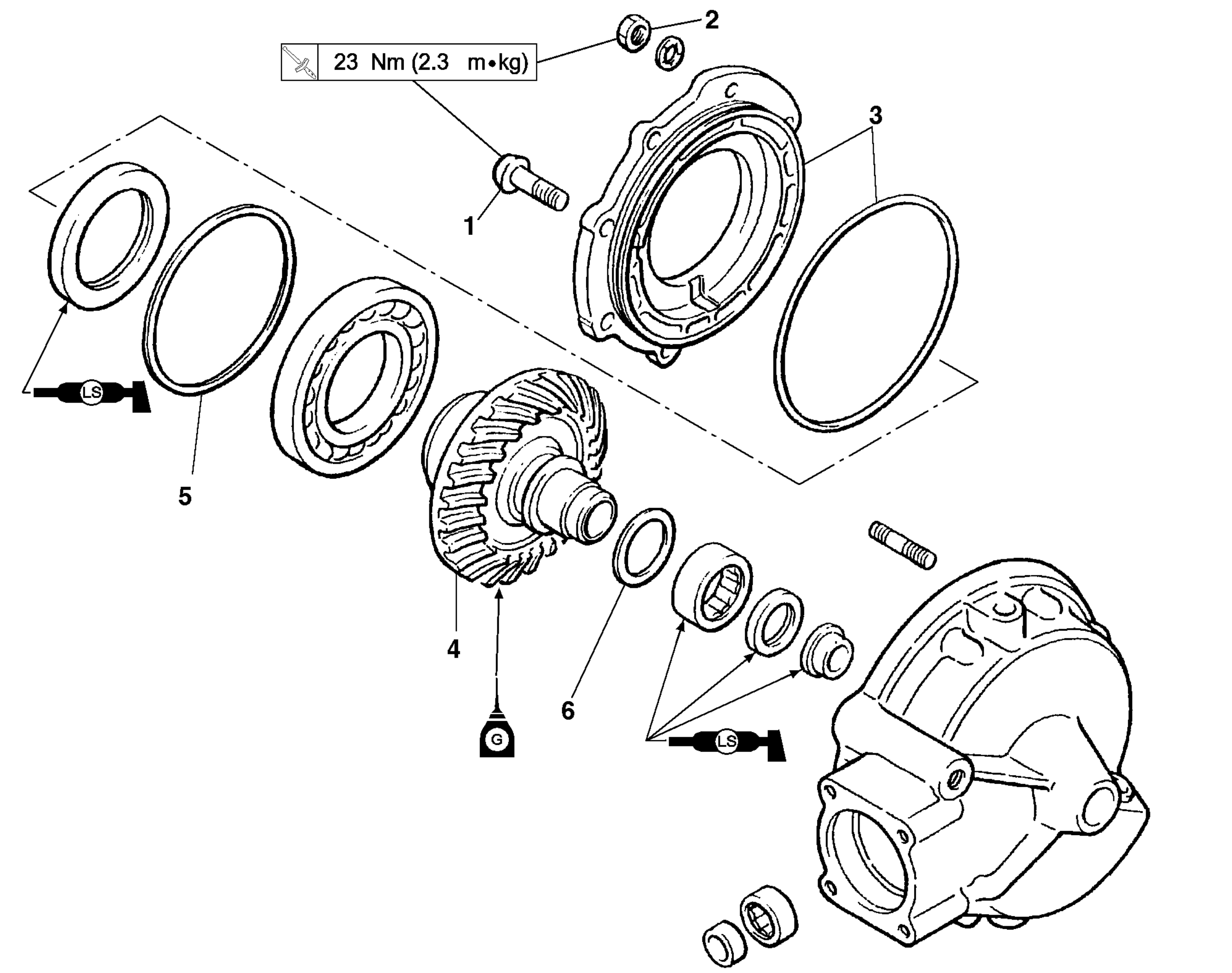
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FINAL DRIVE ASSEMBLY AND DRIVE SHAFT



Order	Job name/Part name	Q'ty	Remarks
	Removing the final drive assembly and drive shaft		Remove the parts in the order listed. Stand the motorcycle on a level surface. **WARNING** **Securely support the motorcycle so there is no danger of it falling over.**
	Rear wheel assembly		Refer to "REAR WHEEL AND BRAKE DISC".
1	Collar	1	
2	Drive shaft assembly	1	
3	Final drive pinion gear assembly	1	Refer to "DISASSEMBLING THE FINAL DRIVE ASSEMBLY/ALIGNING THE FINAL DRIVE PINION GEAR AND RING GEAR".
4	Final gear assembly	1	For installation, reverse the removal procedure.

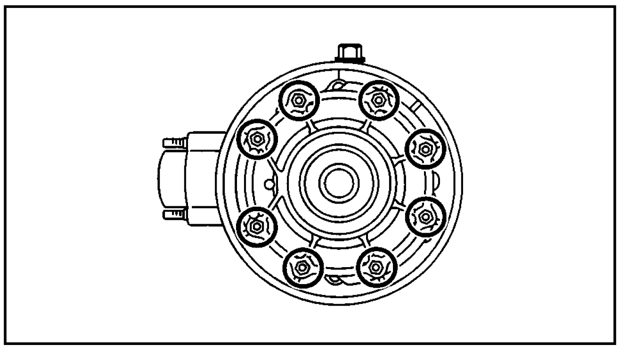
FINAL GEAR



Order	Job name/Part name	Q'ty	Remarks
	Disassembling the final gear		Disassemble the parts in the order listed.
1	Bolts (bearing housing)	2	**NOTE:**
2	Nuts (bearing housing)	6	Working in a crisscross pattern, loosen each bolt and nut 1/4 of a turn. After all the bolts and nuts are loosened, remove them.
3	Bearing housing/O-ring	1/1	
4	Ring gear	1	
5	Shim(-s)	1	
6	Thrust washer	1	
			For assembly, reverse the disassembly procedure.

EASB0029

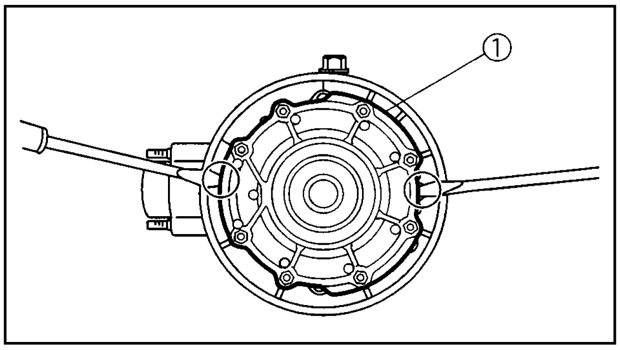
DISASSEMBLING THE FINAL DRIVE ASSEMBLY



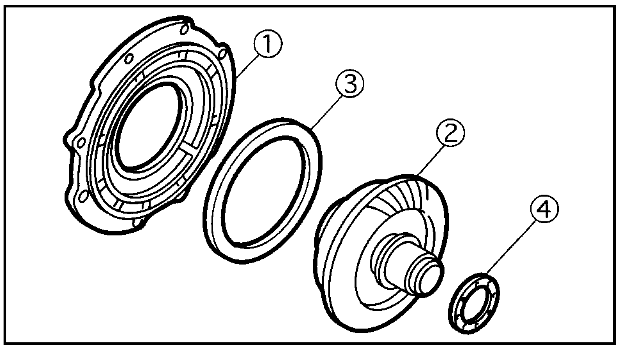
1. Remove:
   - ring gear bearing housing nuts
   - ring gear bearing housing bolts

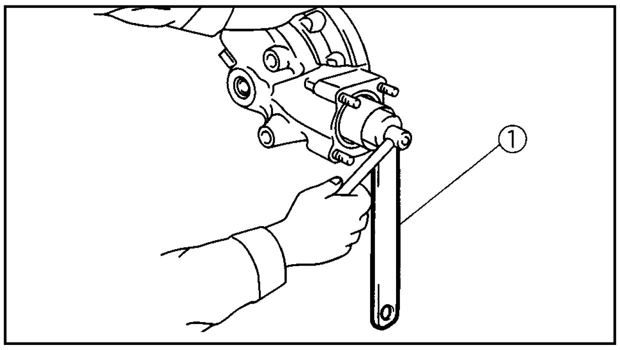
NOTE:

Working in a crisscross pattern, loosen each bolts and nuts 1/4 of a turn. After all of the bolts and nuts are fully loosened, and remove them.



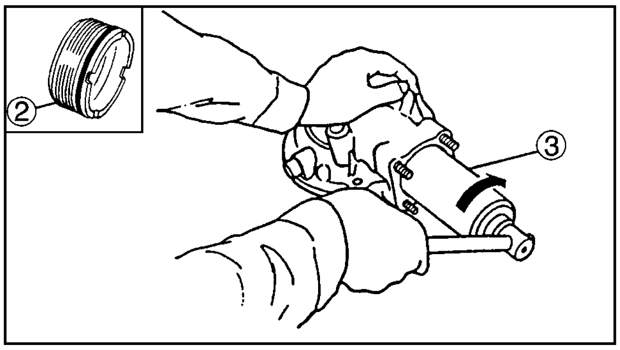
2. Remove:
   - ring gear bearing housing ①
   - ring gear ②
   - ring gear shim(-s) ③
   - thrust washer ④





3. Remove:
   - self-locking nut (coupling gear)
   - gear coupling (with the special tool ①)

Coupling gear/middle shaft tool
90890-01229

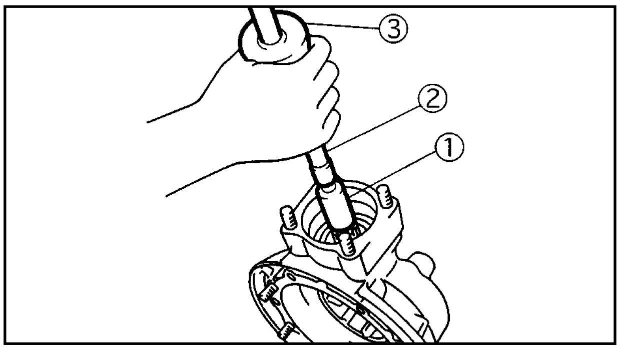


4. Remove:
   - bearing retainer ②
     (with the special tool ③)

Bearing retainer wrench
90890-04050

CAUTION:

The bearing retainer has left-hand threads. To loosen the bearing retainer, turn it clockwise.



5. Remove:
   • final drive pinion gear
     (with the special tools)

	Crankshaft installer bolt adapter ① **90890-01277** **Armature shock puller ②** **90890-01290** **Weight ③** **90890-01291**

WARNING

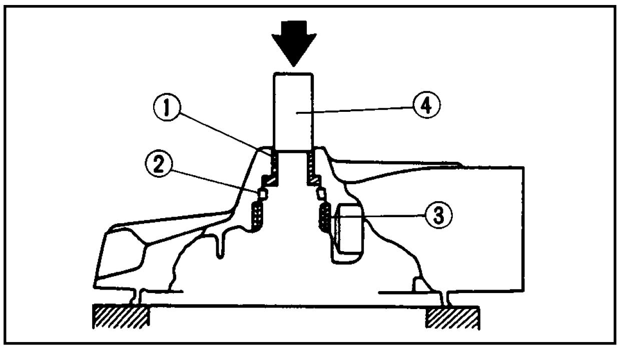
Always use new bearings.

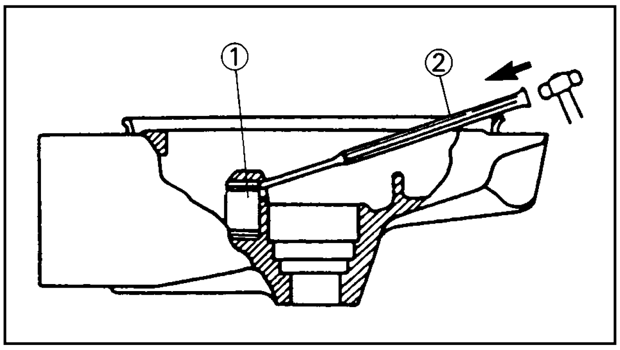
CAUTION:

The final drive pinion gear should only be removed if ring gear replacement is necessary.

EAS06725

REMOVING AND INSTALLING THE RING GEAR BEARINGS





1. Remove:
   • collar ①
   • oil seal ②
   • bearing ③
     (with an appropriate press tool ④ and an appropriate support for the final drive housing)
2. Check:
   • bearing
     Damage → Replace.
3. Remove:
   • bearing ①

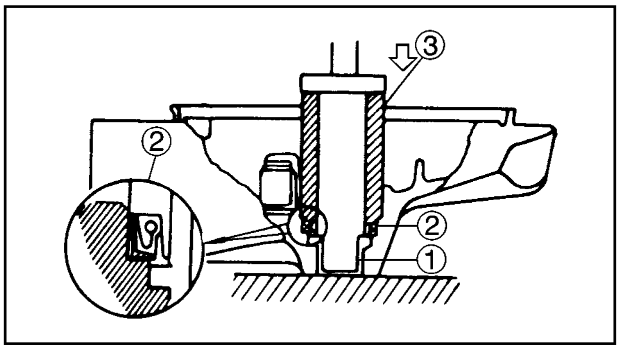
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a. Heat the final gear case to approximately 150 °C (302 °F).
b. Remove the bearing outer races with an appropriately shaped punch ②.
c. Remove the inner race from the final drive pinion gear.

NOTE:

The removal of the final drive pinion gear bearing is a difficult procedure and is rarely necessary.

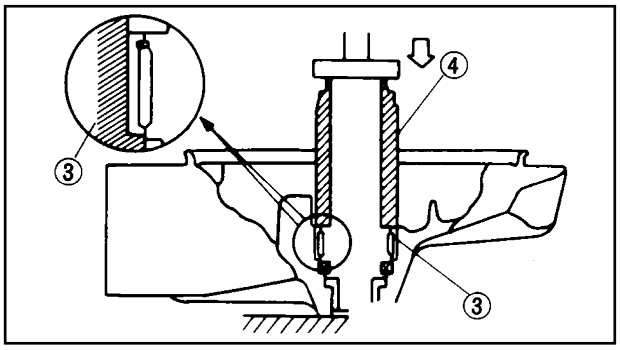
4. Install:
   • bearing New



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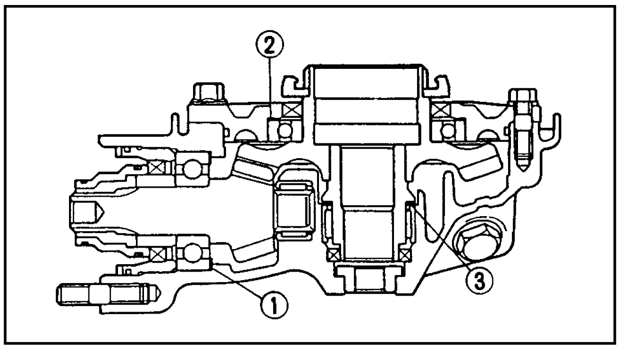
a. Heat the final gear case to approximately 150 °C (302 °F).
b. Install the bearing outer races with a socket or appropriate tool that matches the diameter of the races.
c. Install the inner race onto the final drive pinion gear.

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5. Install:
   - collar ①
   - oil seal ② New
   - bearing
     (with an appropriate press tool ③ and press)

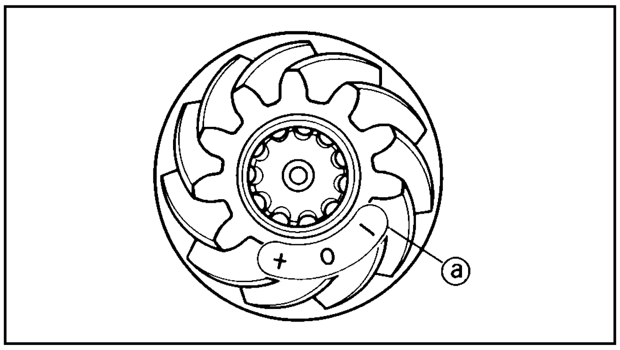
NOTE:
The bearing can be reused, but Yamaha recommends installing a new one.



EAS00726

ALIGNING THE FINAL DRIVE PINION GEAR AND RING GEAR

NOTE:
Aligning the final drive pinion gear and ring gear is necessary when any of the following parts are replaced:
- final drive housing
- any bearing



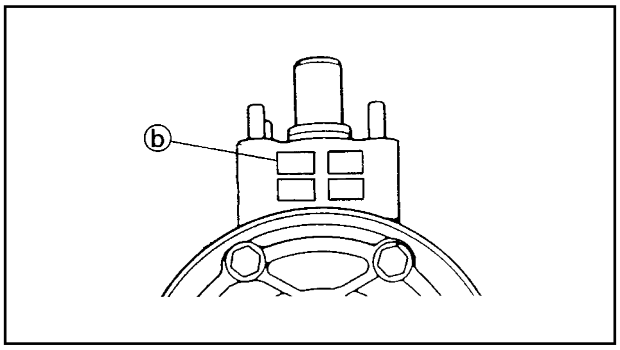
1. Select:
   - final drive pinion gear shim(-s) ①
   - ring gear shim(-s) ②

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a. Position the final drive pinion gear and the ring gear with shims ① and ②. Calculate the respective thicknesses from information marked on the final drive housing and the drive pinion gear.

① Final drive pinion gear shim
② Ring gear shim
③ Thrust washer

b. To find final drive pinion gear shim thickness "A" use the following formula:



Final drive pinion gear shim thickness
A = (84 + ⓐ / 100) – ⓑ

Where:

a = a numeral (positive or negative) on the ring gear, to be divided by 100 and added to “84”

b = a numeral on the final drive housing.

Example:

If the final drive pinion gear is marked “+01” and the final drive housing is marked “83.50”:

A = (84 + 1/100) – (83.50)
 = (84 + 0.01) – (83.50)
 = 84.01 – 83.50
 = 0.51

Therefore, the calculated final drive pinion gear shim thickness is 0.51 mm.

Shim sizes are supplied in the following thicknesses.

	Final drive pinion gear shim
Thickness (mm)	0.30, 0.40, 0.50

Since the final drive pinion gear shims are only available in 0.10 mm increments, round off to the hundredths digit.

Hundredths	Rounded value
0, 1, 2, 3, 4	0
5, 6, 7, 8, 9	10

In the example above, the calculated final drive pinion gear shim thickness is 0.51 mm. The chart instructs you to round off the 1 to 0. Thus, you should use a 0.50 mm final drive pinion gear shim.

c. To find ring gear shim thickness “B, use the following formula:

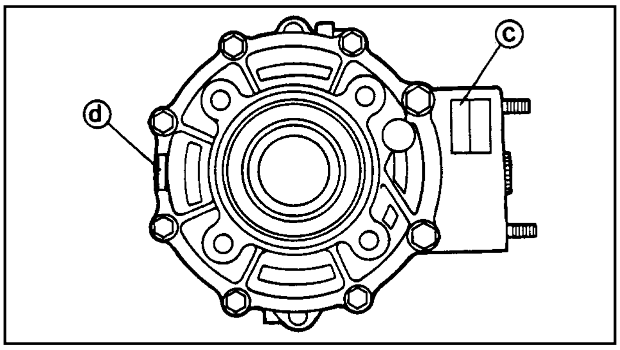
Ring gear shim thickness
B = ⓒ + ⓓ – [(35.40 + ⓔ / 100) + ⓕ]

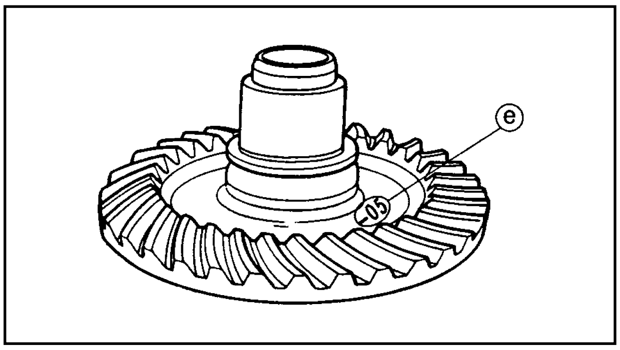
Where:

ⓒ = a numeral on the final drive housing.

ⓓ = a numeral usually on the outside of the ring gear bearing housing.

ⓔ = a numeral (positive or negative) on the inside of the ring gear, to be divided by 100 and added to “35.40”.





ⓕ = the ring gear bearing thickness constant

	Ring gear bearing thickness "ⓕ" **13.00 mm**

Example:

If the final drive housing is marked "45.51" the ring gear bearing housing is marked "3.35" the ring gear is marked "-05", and "f" is 13.00:

A = 45.51 + 3.35 – [(35.40 – 5/100) + 13]
= 45.51 + 3.35 – [(35.40 – 0.05) + 13]
= 48.86 – [35.35 + 13]
= 48.86 – 48.35
= 0.51

Therefore, the calculated ring gear shim thickness is 0.51 mm.

Shim sizes are supplied in the following thickness.

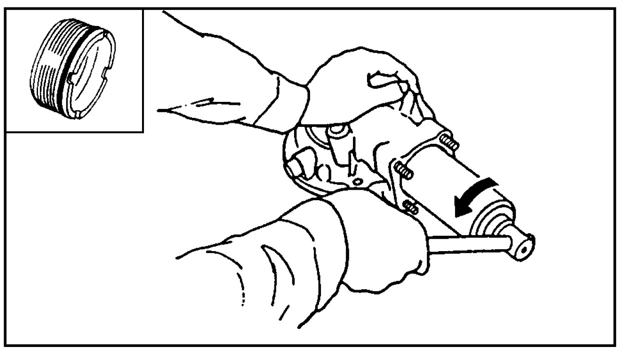
Ring gear shim	
Thickness (mm)	**0.25, 0.30, 0.40, 0.50**

Since the ring gear shims are only available in 0.10 mm increments, round off the hundredths digit.

Hundredths	Rounded value
0, 1, 2, 3, 4	0
5, 6, 7, 8, 9	10

In the example above, the calculated final gear shim thickness is 0.51 mm. The chart instructs you to round off the 1 to 0. Thus, you should use a 0.50 mm ring gear shim.

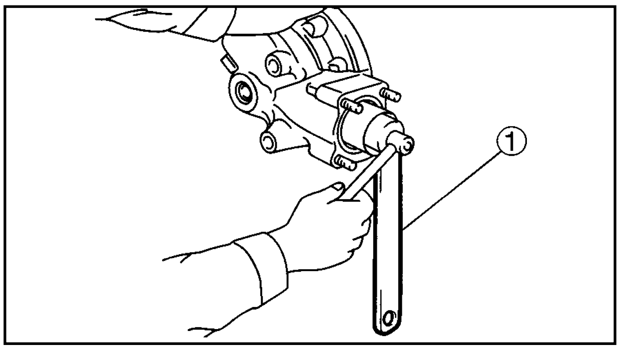
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2. Install:
   - shim(-s) (as calculated)
   - final drive pinion gear
   - bearing retainer **115 Nm (11.5 m•kg)**
     (with the bearing retainer wrench)

CAUTION:

The bearing retainer has left-hand threads. To tighten the bearing retainer, turn it counter-clockwise.



Bearing retainer wrench
90890-04050

3. Install:
   - gear coupling
   - self-locking nut **130 Nm (13.0 m•kg)**
     (with the special tool ①)

Coupling gear/middle shaft tool
90890-01229

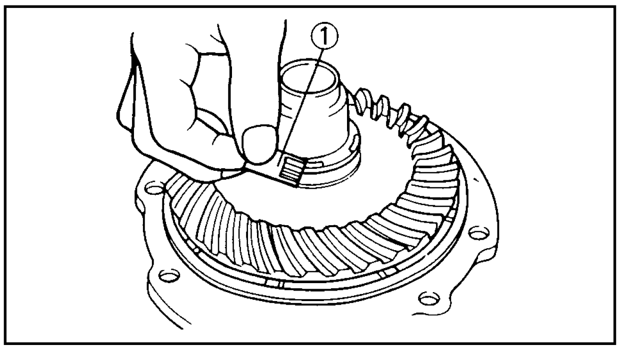
4. Install:
   - ring gear bearing housing
     (along with the ring gear, but without the thrust washer)
5. Adjust:
   - ring gear backlash
     Refer to "MEASURING THE RING GEAR BACKLASH" and "ADJUSTING THE RING GEAR BACKLASH".
6. Measure:
   - ring-gear-to-thrust-washer clearance

▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼

a. Remove the ring gear bearing housing (along with the ring gear).
b. Place four pieces of Plastigauge® between the original thrust washer and the ring gear.
c. Install the ring gear bearing housing and tighten the bolts, and nuts to specification.

Ring gear bearing housing bolt
23 Nm (2.3 m•kg)
Ring gear bearing housing nut
23 Nm (2.3 m•kg)

NOTE:
Do not turn the final drive pinion gear and ring gear while measuring the ring-gear-to-thrust-washer clearance with Plastigauge®.



d. Remove the ring gear bearing housing.
e. Measure the width of the flattened Plastigauge® ①.

	Ring-gear-to-thrust-washer clearance **0.1 ~ 0.2 mm**

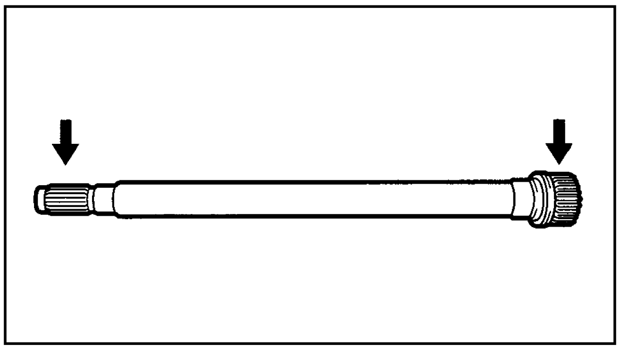
f. If the ring-gear-to-thrust-washer clearance is within specification, install the ring gear bearing housing (along with the ring gear).
g. If the ring-gear-to-thrust-washer clearance is out of specification, select the correct thrust washer as follows.
h. Select the suitable thrust washer from the following chart.

Thrust washer	
Thickness (mm)	**1.2, 1.4, 1.6, 1.8, 2.0**

i. Repeat the measurement steps until the ring-gear-to-thrust-washer clearance is within the specified limits.

	Ring-gear-to-thrust-washer clearance **0.1 ~ 0.2 mm**

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EAS00727

CHECKING THE DRIVE SHAFT

1. Check:
   - drive shaft splines
     Damage/wear → Replace the drive shaft.

EAS00728

INSTALLING THE DRIVE SHAFT

1. Lubricate:
   - drive shaft splines

	Recommended lubricant **Molybdenum disulfide grease**

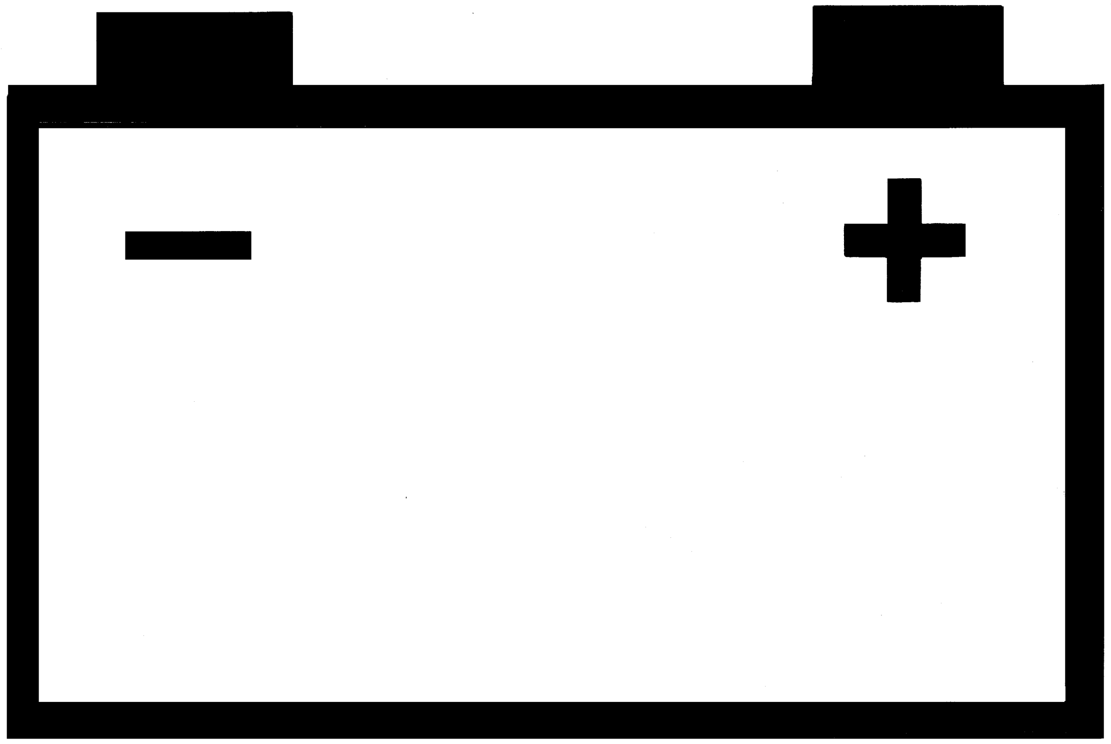
2. Apply:
   - sealant
     (onto both final drive housing mating surfaces)

	Yamaha bond No. 1215 **90890-85505**

3. Install:
   - drive shaft
     (to the final drive pinion gear)
4. Tighten:
   - final bearing housing nuts

50 Nm (5.0 m•kg)

5. Install:
   - rear wheel assembly
     Refer to "REAR WHEEL AND BRAKE DISC".



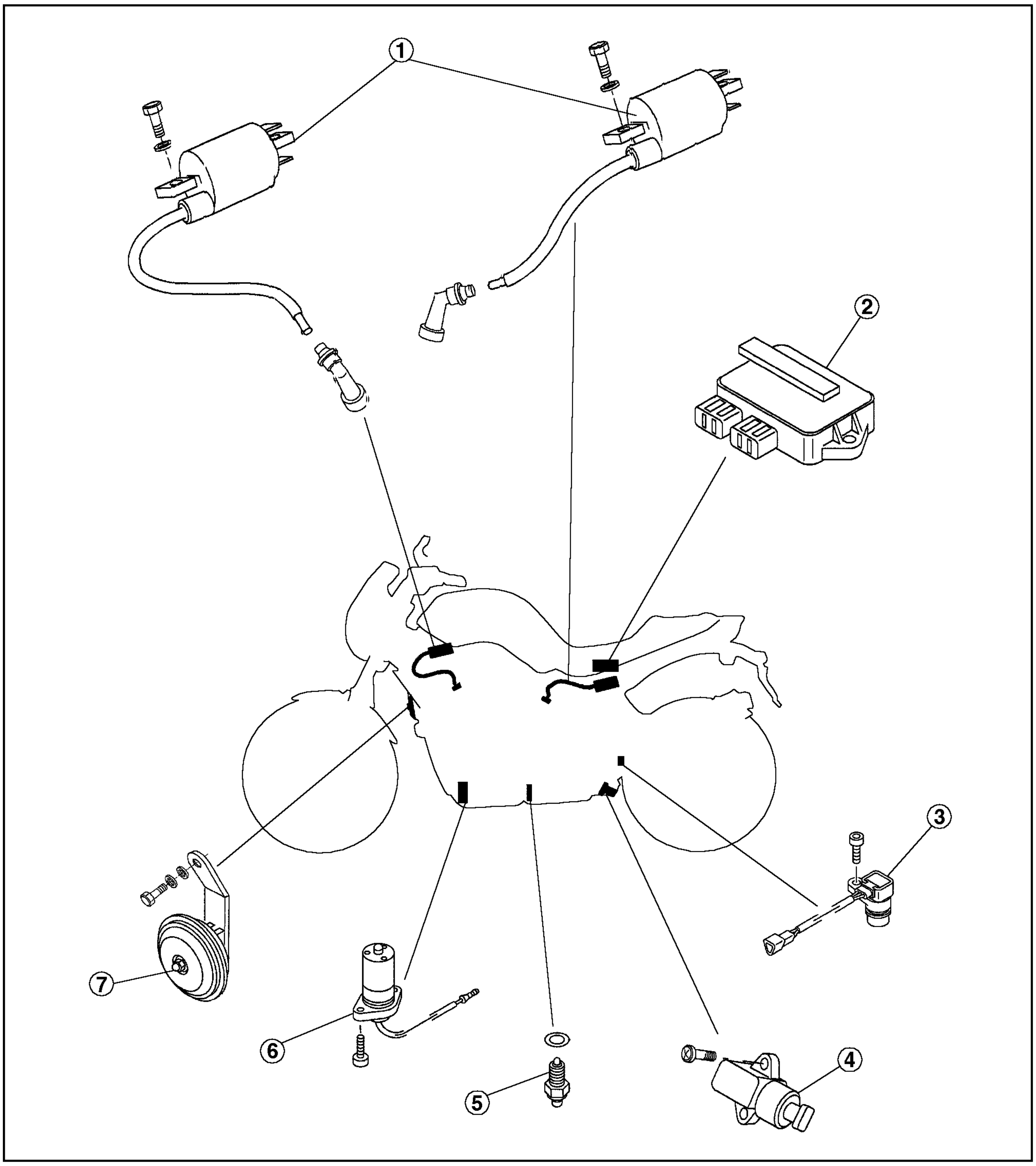
ELEC **7**

CHAPTER 7.
ELECTRICAL

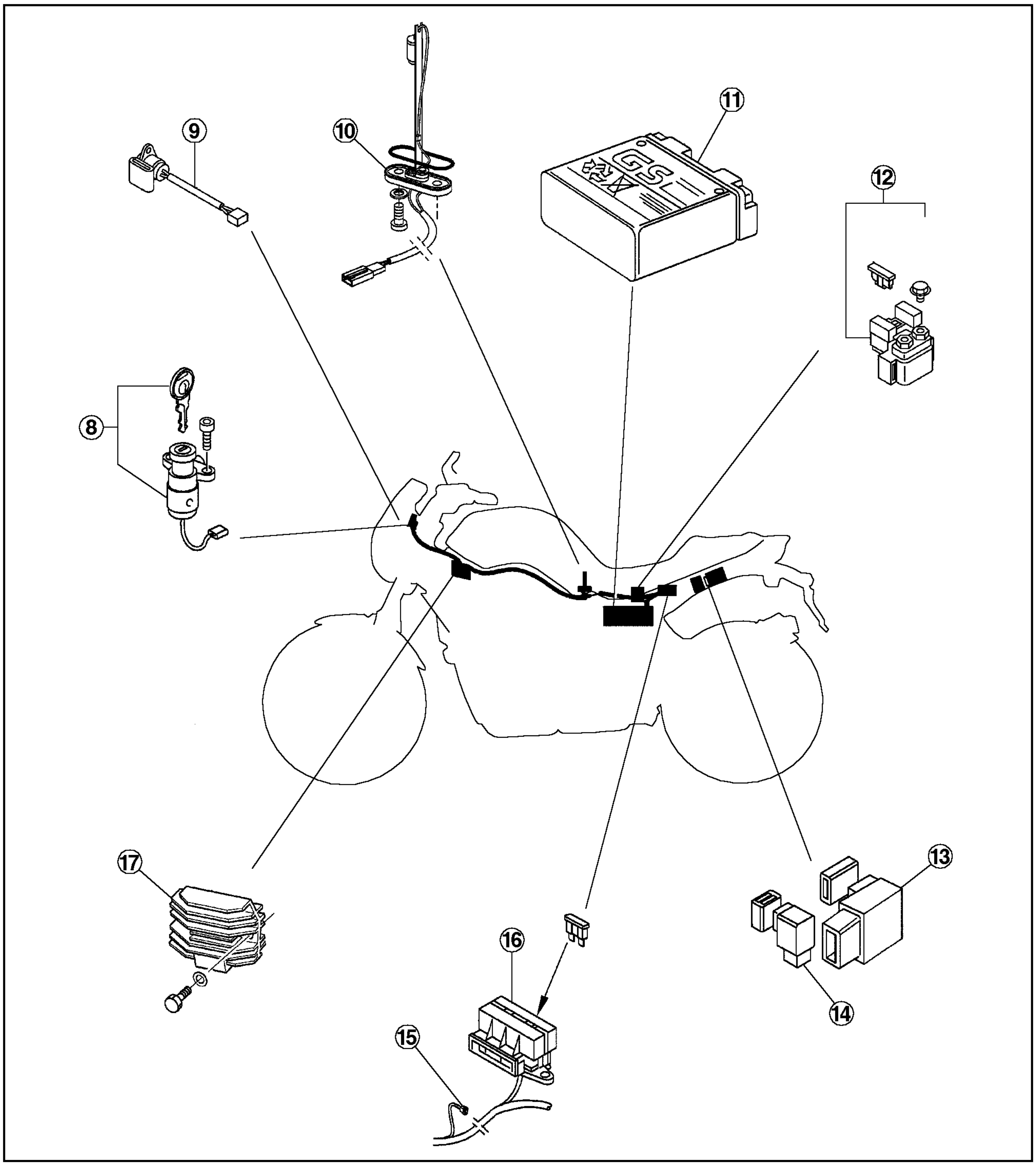
ELECTRICAL

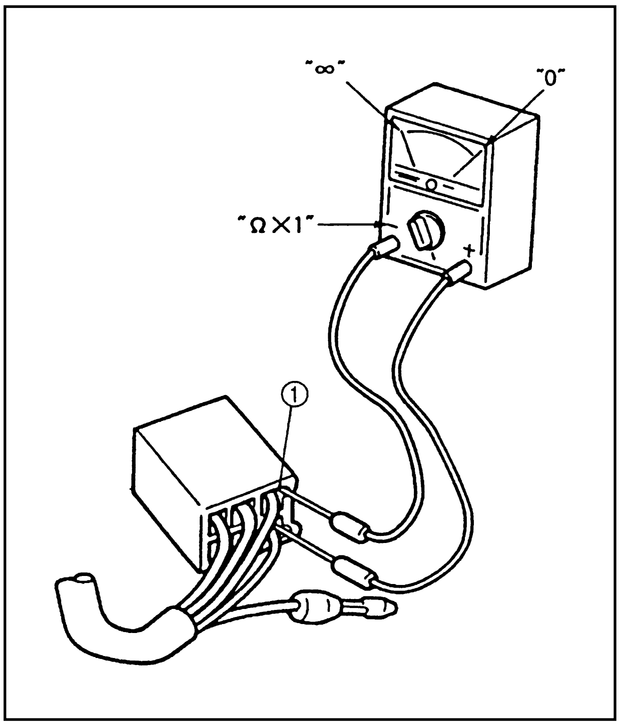
ELECTRICAL COMPONENTS

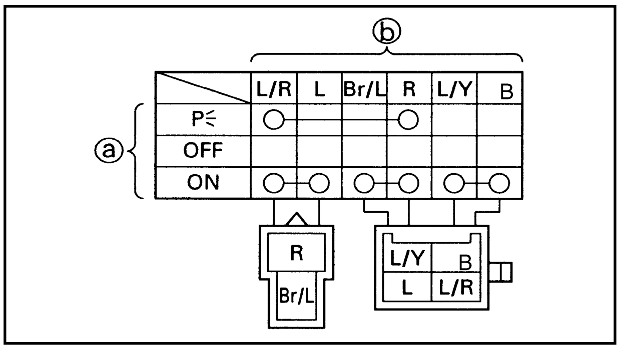
① Ignition coils
② Igniter unit
③ Speed sensor
④ Sidestand switch
⑤ Neutral switch
⑥ Oil level gauge assembly
⑦ Horn



⑧ Main switch
⑨ Thermo switch
⑩ Fuel meter senser unit
⑪ Battery
⑫ Starter relay
⑬ Relay assembly
⑭ Flasher relay
⑮ Diode
⑯ Fuse assembly
⑰ Rectifier/regulator







EAS0010

SWITCHES

CHECKING SWITCH CONTINUITY

Check each switch for continuity with the pocket tester. If the continuity reading is incorrect, check the wiring connections and if necessary, replace the switch.

CAUTION:

Never insert the tester probes into the coupler terminal slots ①. Always insert the probes from the opposite end of the coupler, taking care not to loosen or damage the leads.

	Pocket tester **90890-03112**

NOTE:

- Before checking for continuity, set the pocket tester to “0” and to the “Ω x 1” range.
- When checking for continuity, switch back and forth between the switch positions a few times.

The terminal connections for switches (e.g., main switch, engine stop switch) are shown in an illustration similar to the one on the left.

The switch positions ⓐ are shown in the far left column and the switch lead colors ⓑ are shown in the top row in the switch illustration.

NOTA:

The symbol “○—○” indicates a continuity of electricity between switch terminals (i.e., a closed circuit at the respective switch position).

The example illustration on the left shows that:

There is continuity between Blue/Red and red when the switch is set to “P⚟”.

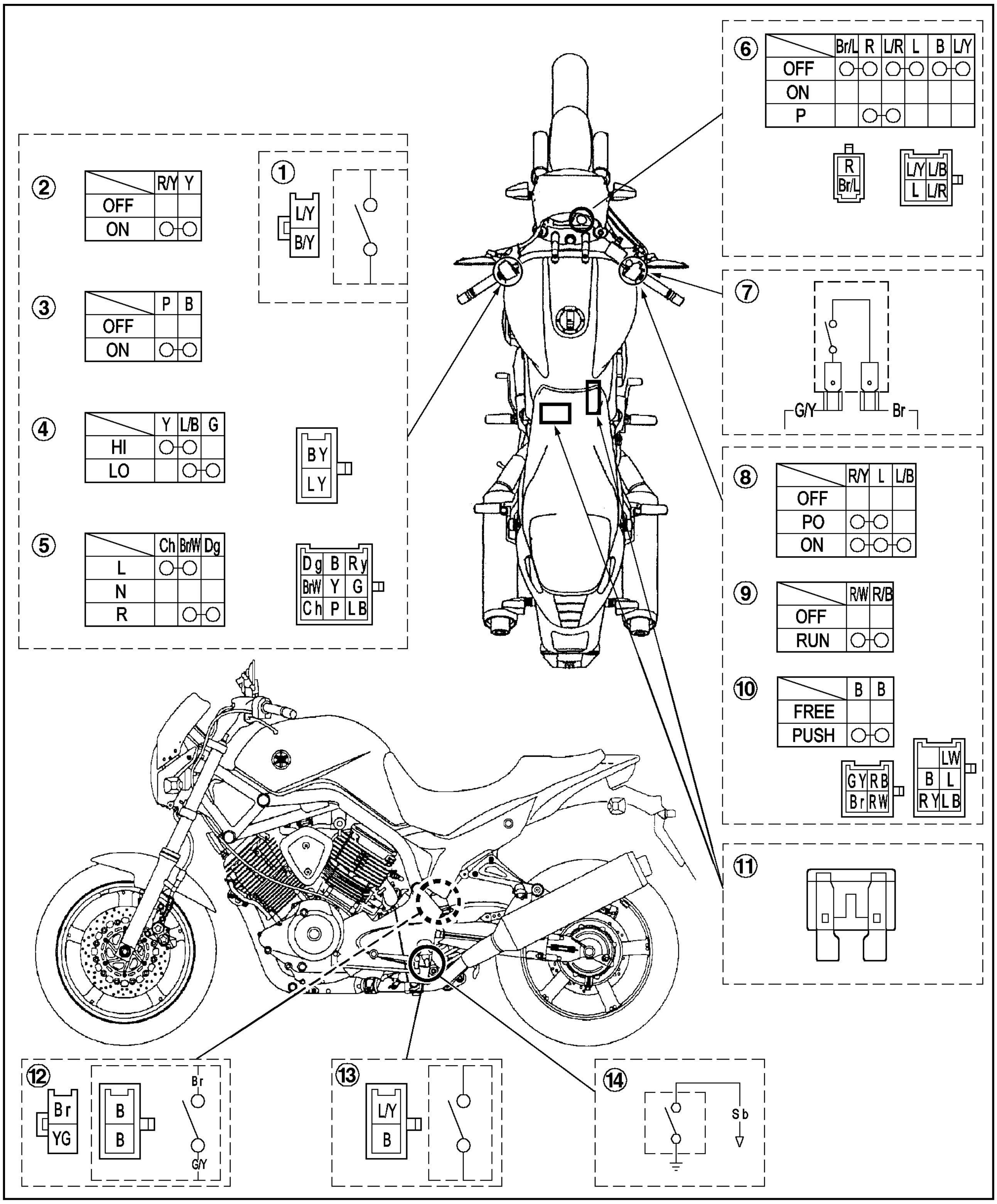
There is continuity between Blue/Red and Blue, between Brown/Blue and Red, and between Blue/Yellow and Black when the switch is set to “ON”.

EAS00731

CHECKING THE SWITCHES

Check each switch for damage or wear, proper connections, and also for continuity between the terminals. Refer to “CHECKING SWITCH CONTINUITY”.

Damage/wear → Repair or replace the switch.
Improperly connected → Properly connect.
Incorrect continuity reading → Replace the switch.

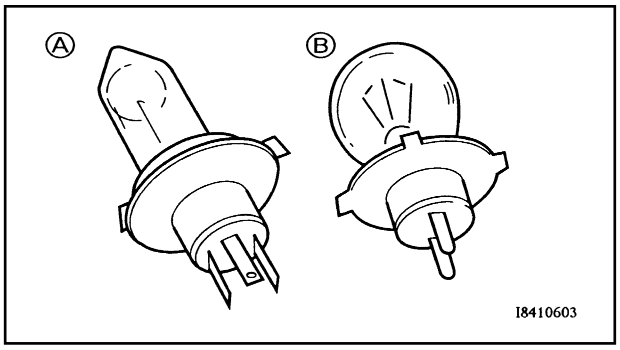


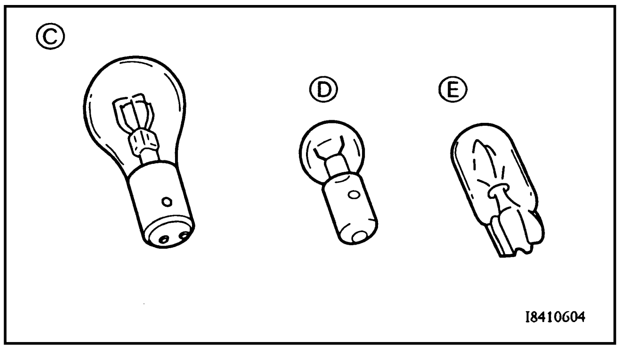
① Clutch switch
② Pass switch
③ Horn switch
④ Dimmer switch
⑤ Turn switch
⑥ Main switch
⑦ Front brake switch
⑧ Lights switch
⑨ Engine stop switch
⑩ Start switch
⑪ Fuses
⑫ Rear brake switch
⑬ Sidestand switch
⑭ Neutral switch

EAS00732

CHECKING THE BULBS AND BULB SOCKETS

Check each bulb and bulb socket for damage or wear, proper connections, and also for continuity between the terminals.
Damage/wear → Repair or replace the bulb, bulb socket or both.
Improperly connected → Properly connect.
Incorrect continuity reading → Repair or replace the bulb, bulb socket or both.





TYPES OF BULBS

Le lampadine utilizzate su questo motociclo sono illustrate nella figura a sinistra.

- The bulbs used on this motorcycle are shown in the illustration on the left.
- Bulbs Ⓐ and Ⓑ are used for headlights and usually use a bulb holder which must be detached before removing the bulb. The majority of these bulbs can be removed from their respective socket by turning them counterclockwise.
- Bulb Ⓒ is used for turn signal and tail/brake lights and can be removed from the socket by pushing and turning the bulb counterclockwise.
- Bulbs Ⓓ and Ⓔ are used for meter and indicator lights and can be removed from their respective socket by turn Ⓓ and pulling Ⓔ them out.

CHECKING THE CONDITION OF THE BULBS

The following procedure applies to all of the bulbs.

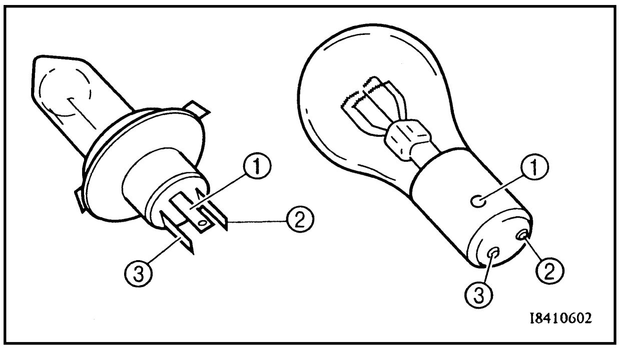
1. Remove:
   - bulb

WARNING

Since the headlight bulb gets extremely hot, keep flammable products and your hands away from the bulb until it has cooled down.

CAUTION:

- **Be sure to hold the socket firmly when removing the bulb. Never pull the lead, otherwise it may be pulled out of the terminal in the coupler.**
- **Avoid touching the glass part of the headlight bulb to keep it free from oil, otherwise the transparency of the glass, the life of the bulb and the luminous flux will be adversely affected. If the headlight bulb gets soiled, thoroughly clean it with a cloth moistened with alcohol or lacquer thinner.**



2. Check:
   - bult (for continuity)
     (with the pocket tester)
     No continuity → Replace.

	Pocket tester **90890-03112**

NOTE:

Before checking for continuity, set the pocket tester to “0” and to the “Ω x 1” range.

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a. Connect the tester positive probe to terminal ① and the tester negative probe to terminal ②, and check the continuity.

b. Connect the tester positive probe to terminal ① and the tester negative probe to terminal ③, and check the continuity.

c. If either of the readings indicate no continuity, replace the bulb.

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CHECKING THE CONDITION OF THE BULB SOCKETS

The following procedure applies to all of the bulb sockets.

1. Check:
   - bulb socket (for continuity)
     (with the pocket tester)
     No continuity → Replace.

	Pocket tester **90890-03112**

NOTE:
Check each bulb socket for continuity in the same manner as described in the bulb section; however, note the following.

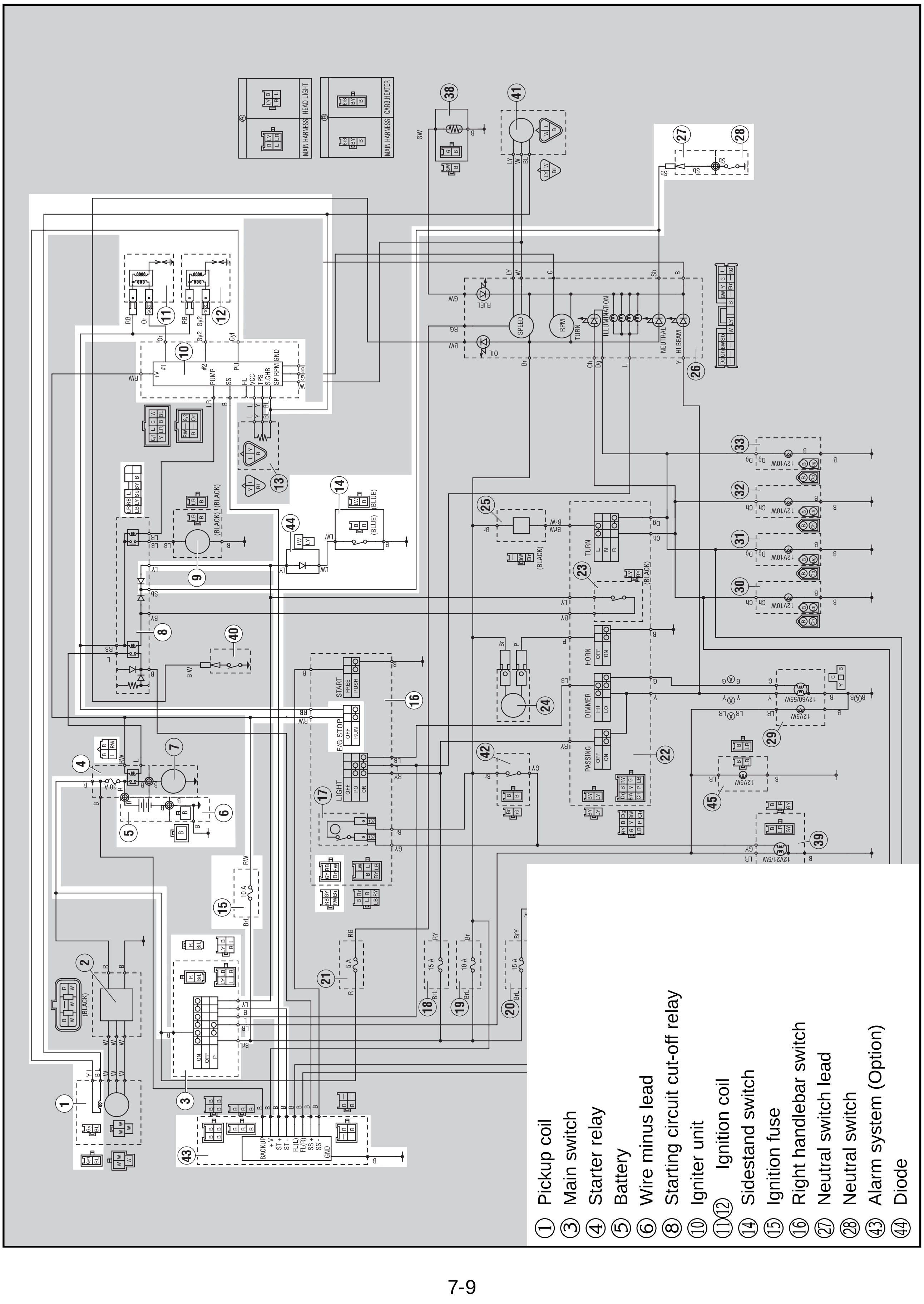
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a. Install a good bulb into the bulb socket.
b. Connect the pocket tester probes to the respective leads of the bulb socket.
c. Check the bulb socket for continuity. If any of the readings indicate no continuity, replace the bulb socket.

▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲

IGNITION SYSTEM

CIRCUIT DIAGRAM



EASB0030

TROUBLESHOOTING

The ignition system fails to operate (no spark or intermittent spark).

Check:
1. Main and ignition fuses
2. Battery
3. Spark plugs
4. Ignition spark gap
5. Spark plug cap resistance
6. Ignition coil resistance
7. Pickup coil resistance
8. Main switch
9. Engine stop switch
10. Neutral switch
11. Sidestand switch
12. Diode
13. Starting circuit cut-off relay (diode)
14. Wiring (of the entire ignition system)

NOTE:
- Before troubleshooting, remove the following part(-s):

1) seat
2) side covers
3) fuel tank (lift)
4) cowling (lift forward)
5) storage compartment/battery cover
6) cylinder head covers

- Troubleshoot with the following special tool(-s).

Ignition checker
90890-06754
Pocket tester
90890-03112

EAS00738

1. Main and ignition fuses

- Check the main and ignition fuses for continuity.
  Refer to "CHECKING THE FUSES" in Chapter 3.
- Are the main and ignition fuses OK?

YES ⇩ NO ⬇

Replace the fuse(-s).

EAS00739

2. Battery

- Check the condition of the battery.
  Refer to "CHECKING AND CHARGING THE BATTERY" in Chapter 3.

Min. open-circuit voltage
12.8 V or more at 20 °C (68 °F)

- Is the battery OK?

YES ⇩ NO ⬇

- Clean the battery terminals.
- Recharge or replace the battery.

EAS00741

3. Spark plugs

The following procedure applies to all of the spark plugs.
- Check the condition of the spark plug.
- Check the spark plug type.
- Measure the spark plug gap.
  Refer to "CHECKING THE SPARK PLUGS" in Chapter 3.

Standard spark plug
BPR7ES
W22EPR-U
Spark plug gap
0.7 ~ 0.8 mm

- Is the spark plug in good condition, is it of the correct type, and its gap within specification?

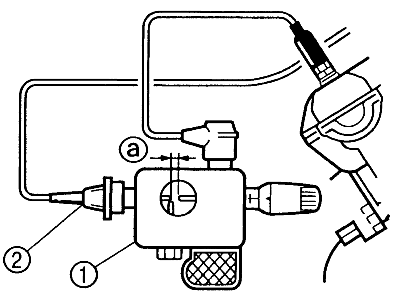
YES ⇩ NO ⬇

Re-gap or replace the spark plug.

EAS00743

4. Ignition spark gap

The following procedure applies to all of the spark plugs.
- Disconnect the spark plug cap from the spark plug.
- Connect the ignition checker ① as shown.
- Spark plug cap ②.
- Set the main switch to "ON".
- Measure the ignition spark gap ⓐ.
- Crank the engine by pushing the start switch and gradually increase the spark gap until a misfire occurs.



Min. ignition spark gap
6 mm

- Is there a spark and is the spark gap within specification ?

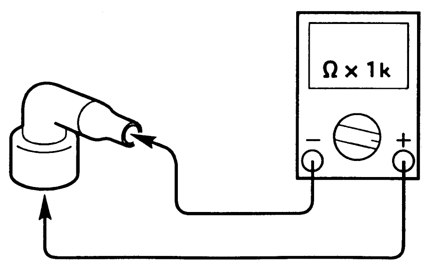
NO ↓ YES ↓

The ignition system is OK.

EAS00745

5. Spark plug cap resistance.

The following procedure applies to all of the spark plug caps.
- Disconnect the spark plug cap from the spark plug.
- Connect the pocket tester (Ω × 1k) to the spark plug cap as shown.
- Measure the spark plug cap resistance.



Spark plug cap resistance
10 kΩ at 20°C (68 °F)

- Is the spark plug cap OK?

YES ↓ NO ↓

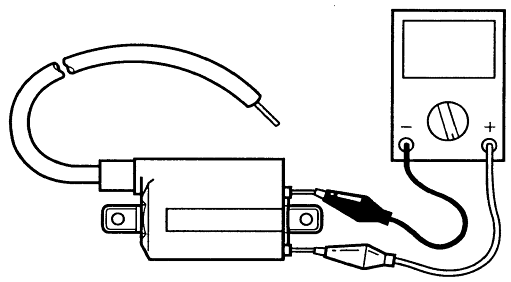
Replace the spark plug cap.

EAS00747

6. Ignition coil resistance

The following procedure applies to all of the ignition coils.
- Disconnect the ignition coil connectors from the ignition coil terminals.
- Connect the pocket tester (Ω × 1) to the ignition coil as shwon.

Tester positive probe → Red/Black
Tester negative probe → Orange (Gray)

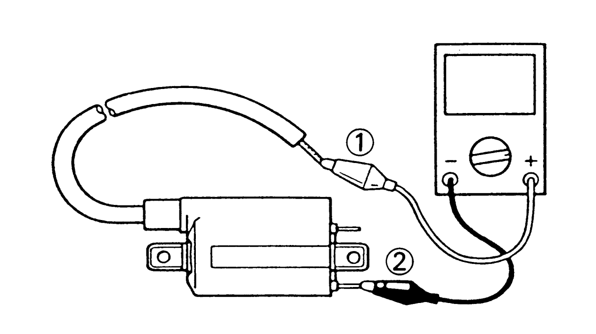


- Measure the primary coil resistance.

Primary coil resistance
3.57 ~ 4.83 Ω at 20°C (68 °F)

- Connect the pocket tester (Ω × 1k) to the ignition coil as shown.
- Measure the secondary coil resistance.

Tester positive probe →
spark plug lead ①
Tester negative probe →
Orange (gray) lead ②



Secondary coil resistance
10.7 ~ 14.5 kΩ at 20°C (68°F)

- Is the ignition coil OK?

YES / NO

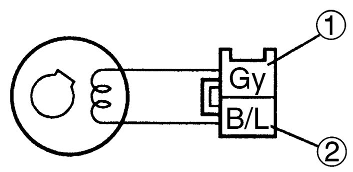
Replace the ignition coil.

EAS00748

7. Pickup coil resistance

- Disconnect the pickup coil coupler from the wire harness.
- Connect the pocket tester (Ω × 100) to the pickup coil terminal.

Tester positive probe → Gray ①
Tester negative probe → Black/Blue ②



- Measure the pickup coil resistance.

Pickup coil resistance
189 ~ 231 Ω at 20°C (68°F)
(between Gray and Black/Blue)

- Is the pickup coil OK?

YES / NO

Replace the pickup coil.

EAS00749

8. Main switch

- Check the main switch for continuity. Refer to “CHECKING THE SWITCHES”.
- Is the main switch OK?

YES / NO

Replace the main switch.

EAS00750

9. Engine stop switch

- Check the engine stop switch for continuity. Refer to “CHECKING THE SWITCHES”.
- Is the engine stop switch OK?

YES / NO

Replace the right handlebar switch.

EAS00751

10. Neutral switch

- Check the neutral switch for continuity. Refer to “CHECKING THE SWITCHES”.
- Is the neutral switch OK?

YES / NO

Replace the neutral switch.

EAS00752

11. Sidestand switch

- Check the sidestand switch for continuity. Refer to “CHECKING THE SWITCHES”.
- Is the sidestand switch OK?

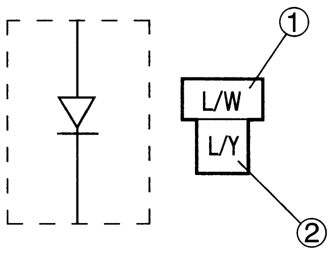
YES / NO

Replace the sidestand switch.

*

12. Diode	
• Remove the diode from the wire harness. • Check for continuity as follows:	
Tester (+) lead → Blue/White ② Tester (–) lead → Blue/Yellow ②	**Continuity**
Tester (+) lead → Blue/Yellow ② Tester (–) lead → Blue/White ①	**No Continuity**

NOTE:
When you switch the "–" and "+" leads of the digital pocket tester the readings in the above chart will be reversed.



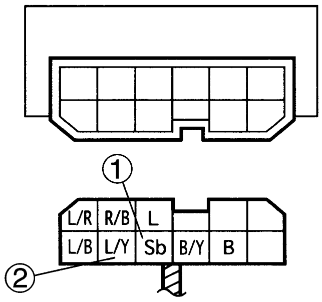
• Is the diode OK?

YES ↓ NO ↓

Replace the diode.

13. Starting circuit cut-off relay (diode)	
• Remove the relay unit from the wire harness. • Check for continuity as follows: Sky blue – Blue/Yellow ②	
Tester (+) lead → Sky blue ① Tester (–) lead → Blue/Yellow ②	**Continuity**
Tester (+) lead → Blue/Yellow ② Tester (–) lead → Sky blue ①	**No Continuity**

NOTE:
When you switch the "–" and "+" leads of the digital pocket tester the readings in the above chart will be reversed.



• Is the starting circuit cut-off relay (diode) OK?

YES ↓ NO ↓

Replace the starting circuit cut-off relay.

EAS00754

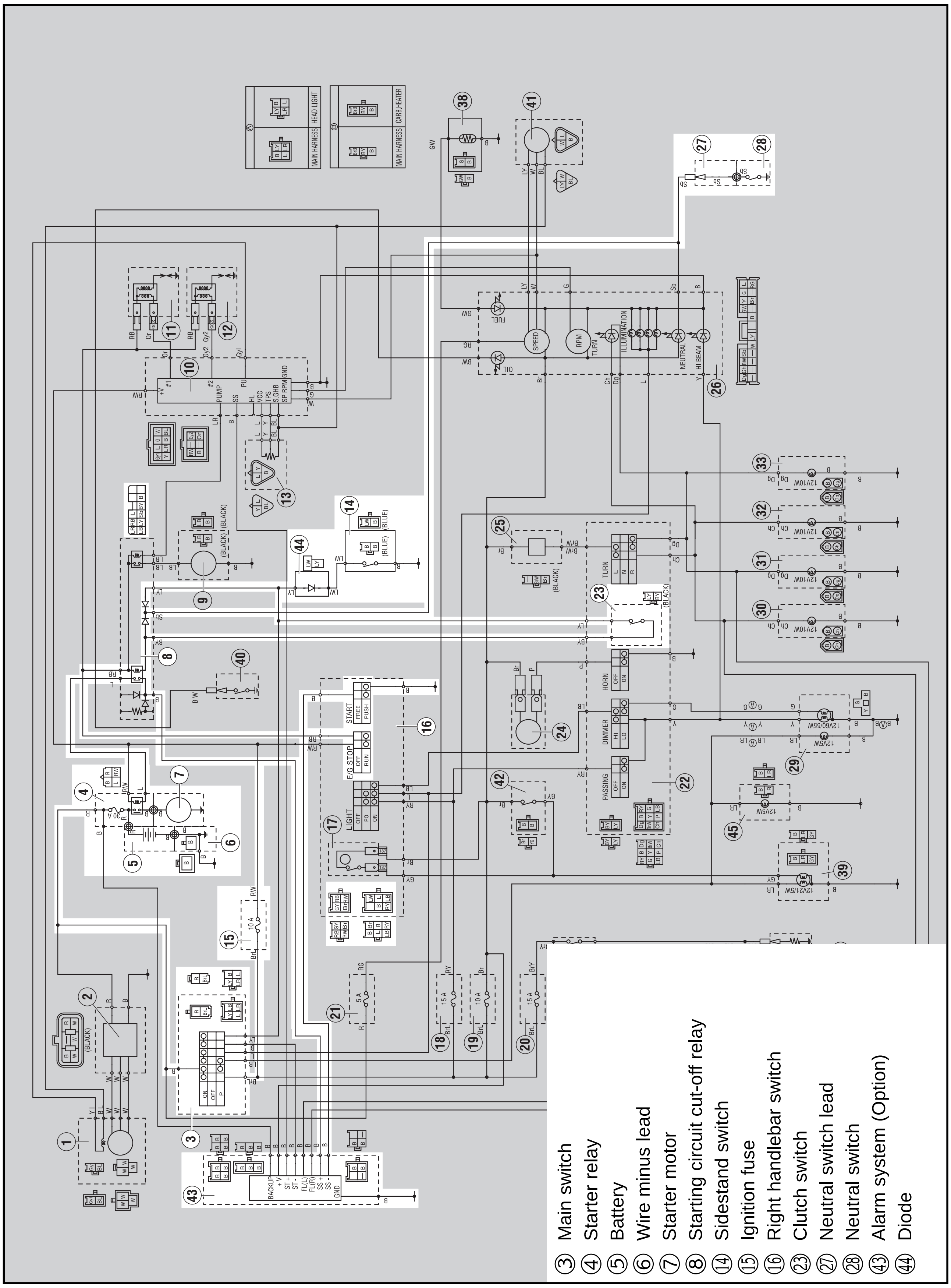
14. Wiring
• Check the entire ignition system's wiring. Refer to "CIRCUIT DIAGRAM". • Is the ignition system's wiring properly connected and without defects?

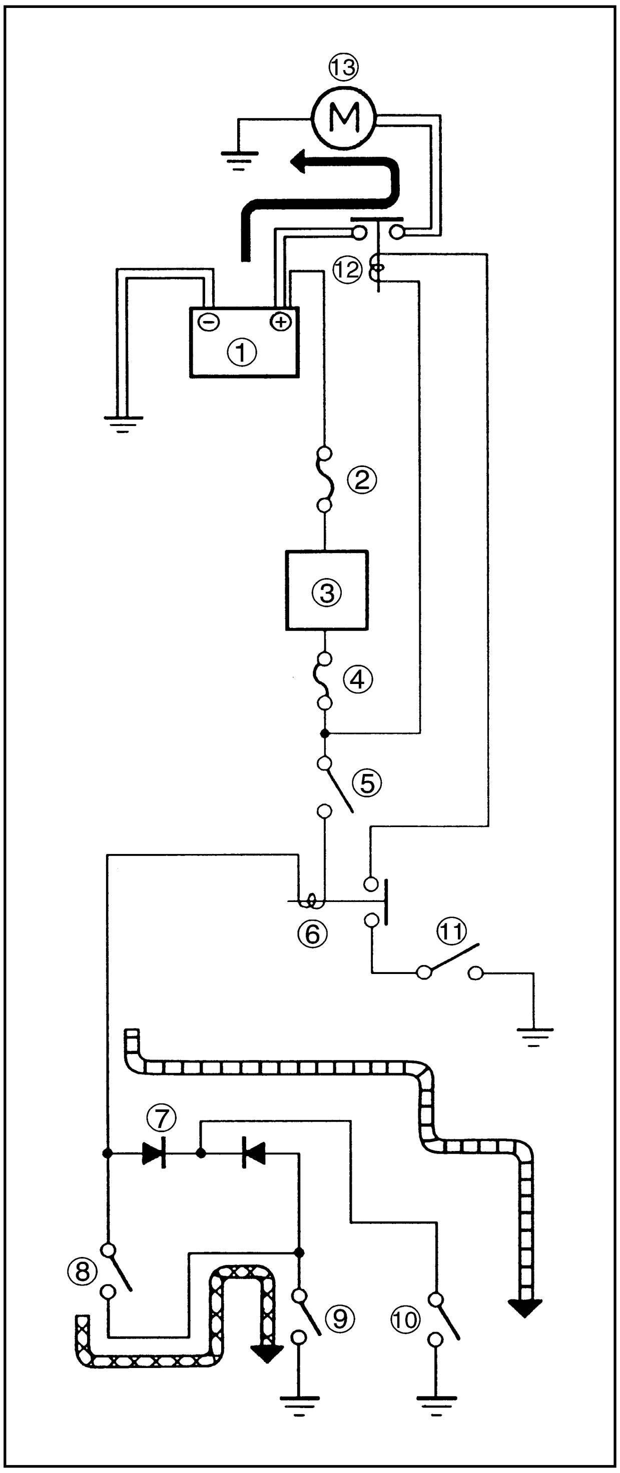
NO ↓ YES ↓

NO	YES
Properly connect or repair the ignition system's wiring.	Replace the ignitor unit.

ELECTRIC STARTING SYSTEM

CIRCUIT DIAGRAM





EB803010

STARTING CIRCUIT OPERATION

The starting circuit on this model consists of the starter motor, starter relay, and the starting circuit cut-off relay. If the engine stop switch is on “RUN” and the main switch is on “ON” (both switches are closed), the starter motor can operate only if:

> The transmission is in neutral (the neutral switch is closed).
>
> **or if**
>
> The clutch lever is pulled to the handlebar (the clutch switch is closed) and the sidestand is up (the sidestand switch is closed).

The starting circuit cut-off relay prevents the starter from operating when neither of these conditions have been met. In this instance, the starting circuit cut-off relay is open so current cannot reach the starter motor.

When at least one of the above conditions have been met however, the starting circuit cut-off relay is closed, and the engine can be started by pressing the starter switch.

WHEN THE TRANSMISSION IS IN NEUTRAL

WHEN THE SIDESTAND IS UP AND THE CLUTCH LEVER IS PULLED IN

① Battery
② Main fuse
③ Main switch
④ Ignition fuse
⑤ Engine stop switch
⑥ Starting circuit cut-off relay
⑦ Diode
⑧ Clutch switch
⑨ Sidestand switch
⑩ Neutral switch
⑪ Start switch
⑫ Starter relay
⑬ Starter motor

EASB0031

TROUBLESHOOTING

The starter motor fails to turn.

Check:
1. Main and ignition fuses
2. Battery
3. Starter motor
4. Starting circuit cutoff relay
5. Starting circuit cutoff relay (diode)
6. Starter relay
7. Main switch
8. Engine stop switch
9. Neutral switch
10. Sidestand switch
11. Clutch switch
12. Start switch
13. Diode
14. Wiring (of the entire starting system)

NOTE:
- Before troubleshooting, remove the following part(-s):

1) seat
2) side covers
3) fuel tank (lift)
4) cowling (lift forward)
5) storage compartment/battery cover

- Troubleshoot with the following special tool(-s).

	Pocket tester **90890-03112**

EAS00738

1. Main and ignition fuses
• Check the main and ignition fuses for continuity.   Refer to "CHECKING THE FUSES" in Chapter 3   • Are the main and ignition fuses OK?

YES ⇩ NO ⬇

Replace the fuse(-s).

EAS00739

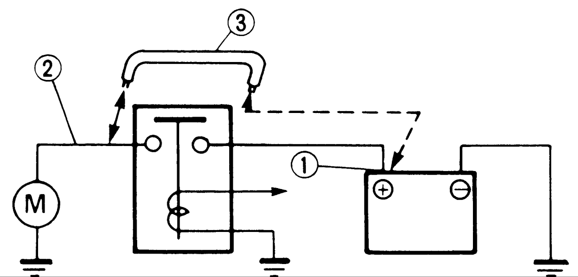
2. Battery
• Check the condition of the battery.   Refer to "CHECKING AND CHARGING THE BATTERY" in Chapter 3.
Min. open-circuit voltage: **12.8 V or more at 20 °C (68 °F)**
• Is the battery OK?

YES ⇩ NO ⬇

- Clean the battery terminals.
- Recharge or replace the battery.

EAS00758

3. Starter motor
• Connect the battery positive terminal ① and starter motor lead ② with a jumper lead ③.



⚠ WARNING

- **A wire that is used as a jumper lead must have at least the same capacity of the battery lead, otherwise the jumper lead may burn.**
- **This check is likely to produce sparks, therefore make sure that no flammable gas or fluid is in the vicinity.**

- Does the starter motor turn?

YES ⇩ NO ⬇

Repair or replace the starter motor.

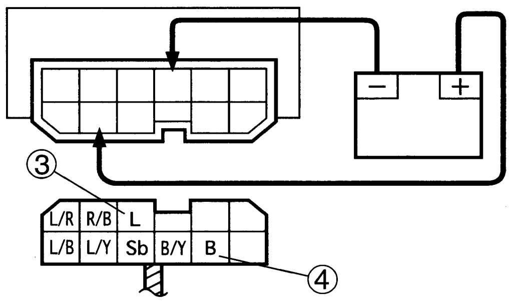
EAS00739

4. Starting circuit cutoff relay

- Disconnect the relay unit from the coupler.
- Connect the pocket tester (Ω × 1) and battery (12V) to the relay unit terminals as shown.

Battery positive terminal → Red/Black ①
Battery negative terminal → Black/Yellow ②

Tester positive probe → Blue ③
Tester negative probe → Black ④



- Does the starting circuit cutoff relay have continuity between Black and Blue/White?

YES

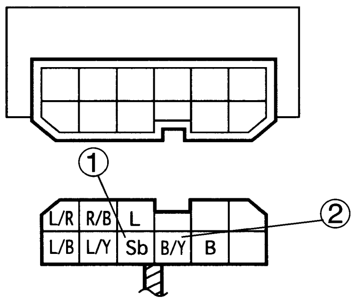
NO → Replace the relay unit.

EAS00760

5. Starting circuit cutoff relay (diode)

- Disconnect the starting circuit cutoff relay from the coupler.
- Connect the pocket tester (Ω × 1) to the starting circuit cutoff relay terminals as shown
- Measure the starting circuit cutoff relay for continuity as follows.

Tester positive probe → Sky blue ① **Tester negative probe → Black/Yellow ②**	**Continuity**
Tester positive probe → Black/Yellow ② **Tester negative probe → Sky blue ①**	**No continuity**



NOTE:
When you switch the "–" and "+" leads of the digital pocket tester the readings in the above chart will be reversed.

- Are the tester readings correct?

YES

NO → Replace the relay unit.

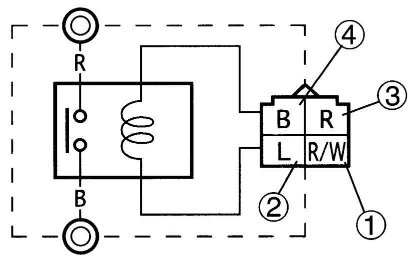
EAS00761

6. Starter relay

- Disconnect the starter relay from the coupler.
- Connect the pocket tester (Ω × 1) and battery (12V) to the starter relay coupler as shown.

Battery positive terminal → Red/White ①
Battery negative terminal → Blue ②

Tester positive probe → Red ③
Tester negative probe → Black ④



- Does the starter relay have continuity between Red and Black?

YES ⇩ NO ⬇

Replace the starter relay.

EAS00749

7. Main switch

- Check the main switch for continuity. Refer to “CHECKING THE SWITCHES”.
- Is the main switch OK?

YES ⇩ NO ⬇

Replace the main switch.

EAS00750

8. Engine stop switch

- Check the engine stop switch for continuity. Refer to “CHECKING THE SWITCHES”.
- Is the engine stop switch OK?

YES ⇩ NO ⬇

Replace the right handlebar switch.

EAS00751

9. Neutral switch

- Check the neutral switch for continuity. Refer to “CHECKING THE SWITCHES”.
- Is the neutral switch OK?

YES ⇩ NO ⬇

Replace the neutral switch.

EAS00752

10. Sidestand switch

- Check the sidestand switch for continuity. Refer to “CHECKING THE SWITCHES”.
- Is the sidestand switch OK?

YES ⇩ NO ⬇

Replace the sidestand switch.

EAS00763

11. Clutch switch

- Check the clutch switch for continuity. Refer to “CHECKING THE SWITCHES”.
- Is the clutch switch OK?

YES ⇩ NO ⬇

Replace the clutch switch.

EAS00764

12. Start switch

- Check the start switch for continuity.
  Refer to “CHECKING THE SWITCHES”.
- Is the start switch OK?

YES → (continue)

NO → Replace the right handlebar switch.

13. Diode

- Check the diode for continuity.
  Refer to “IGNITION SYSTEM”.
- Is the diode OK?

YES → (continue)

NO → Replace the diode.

EAS00766

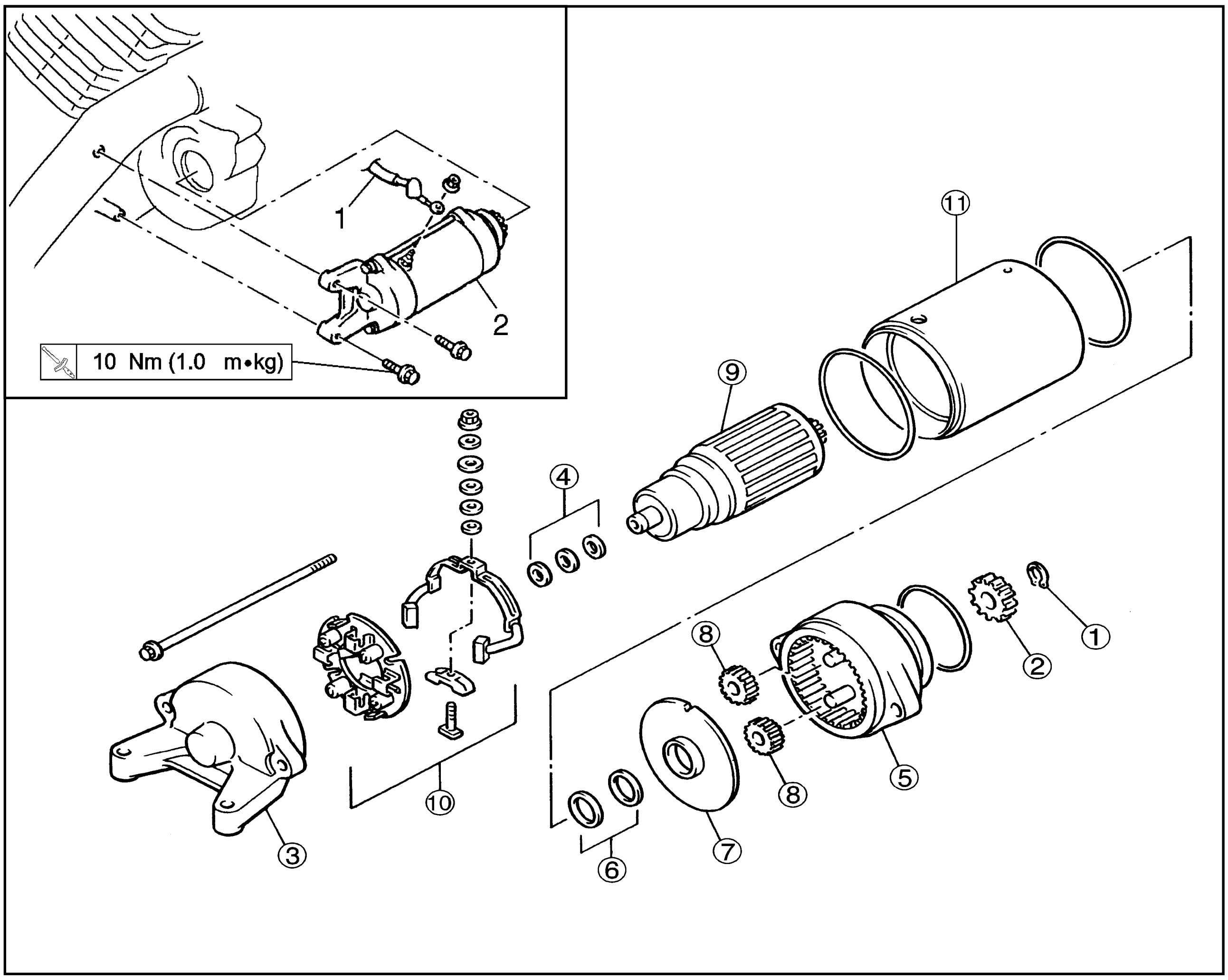
14. Wiring

- Check the entire starting system’s wiring.
  Refer to “CIRCUIT DIAGRAM”.
- Is the starting system’s wiring properly connected and without defects?

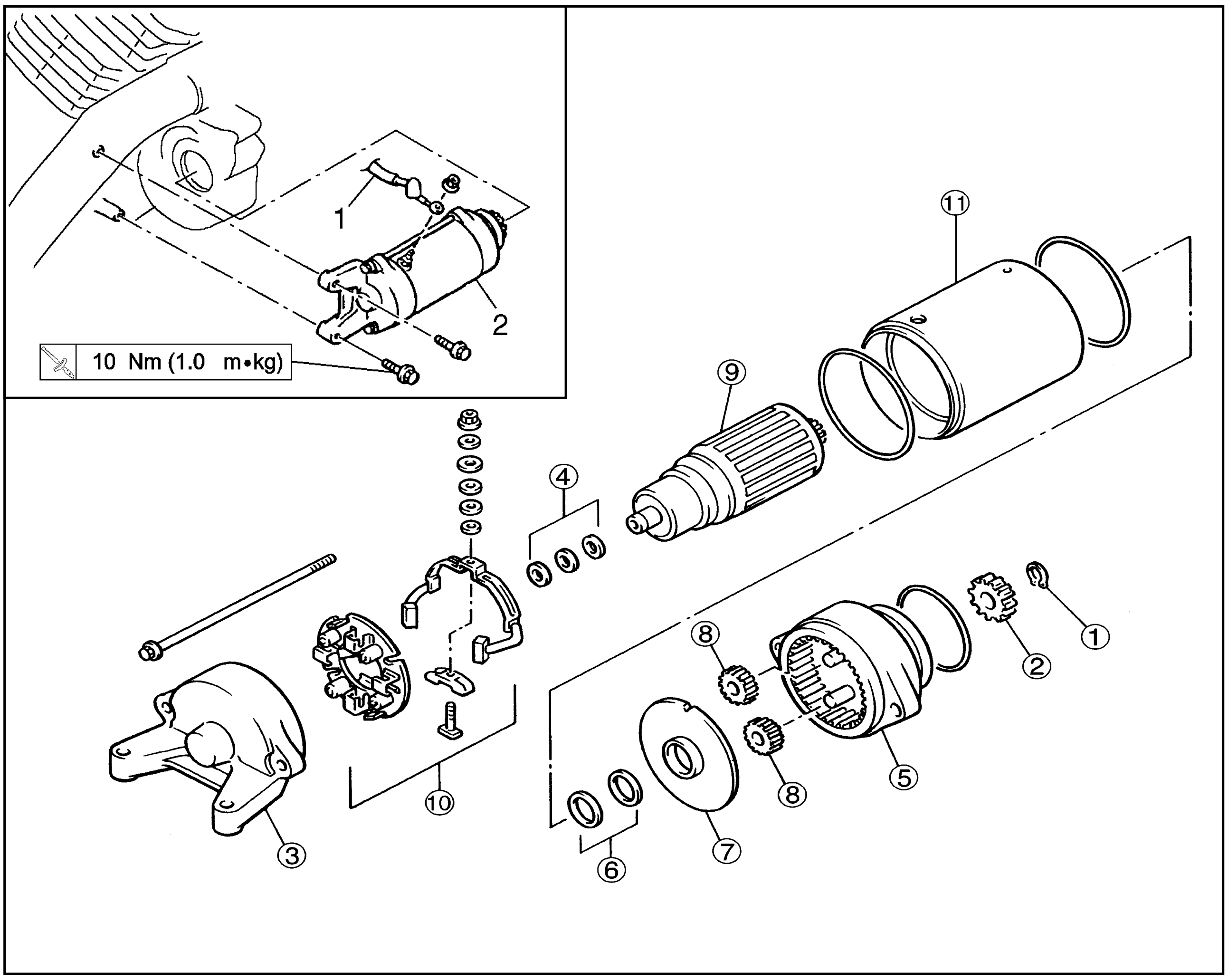
NO → Properly connect or repair the starting system’s wiring.

YES → The starting system circuit is OK.

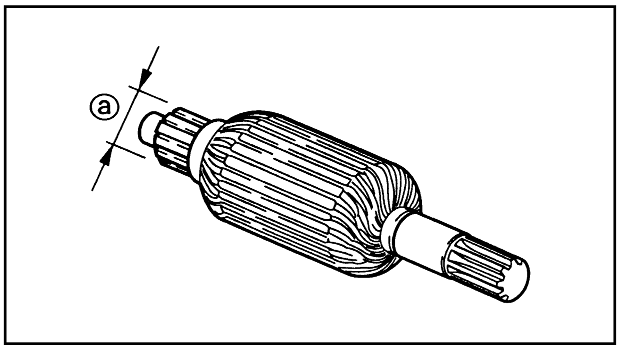
STARTER MOTOR

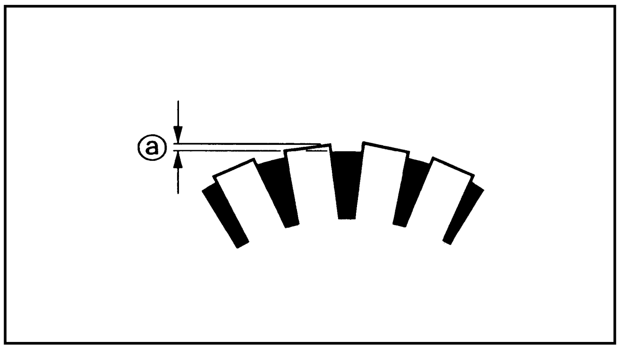


Order	Job name/Part name	Q'ty	Remarks
	Removing the starter motor		Remove the parts in the order listed.
1	Starter motor lead	1	
2	Starter motor assembly	1	
			For installation, reverse the removal procedure.
	Disassembling the starter motor		Disassembly the pats in the order listed.
①	Circlip	1	
②	Starter motor drive gear	1	
③	Starter motor rear cover	1	Refer to “Assembling the starter motor”.
④	Washer set	1	
⑤	Starter motor front cover	1	Refer to “Assembling the starter motor”.



Order	Job name/Part name	Q'ty	Remarks
⑥	Washer set	1	
⑦	End bracket	1	Refer to "Assembling the starter motor."
⑧	Planetary gears	2	
⑨	Armature assembly	1	
⑩	Brush holder/brush	1/1	Refer to "Assembling the starter motor."
⑪	Starter motor yoke	1	
			For assembly, reverse the disassembly procedure.





EAS00769

Checking the starter motor

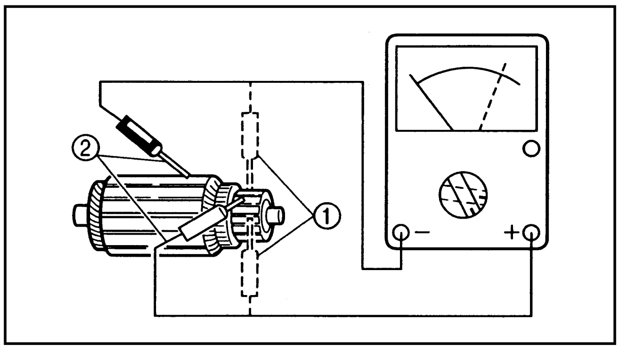
1. Check:
   - commutator
     Dirt → Clean with 600 grit sandpaper.
2. Measure:
   - commutator diameter ⓐ
     Out of specification → Replace the starter motor.

	Min. commutator diameter **27 mm**

3. Measure:
   - mica undercut ⓐ
     Out of specification → Scrape the mica to the proper measurement with a hacksaw blade which has been grounded to fit the commutator.

	Mica undercut **0.7 mm**

NOTE:
The mica must be undercut to ensure proper operation of the commutator.



4. Measure:
   - armature assembly resistances (commutator and insulation)
     Out of specification → Replace the starter motor.

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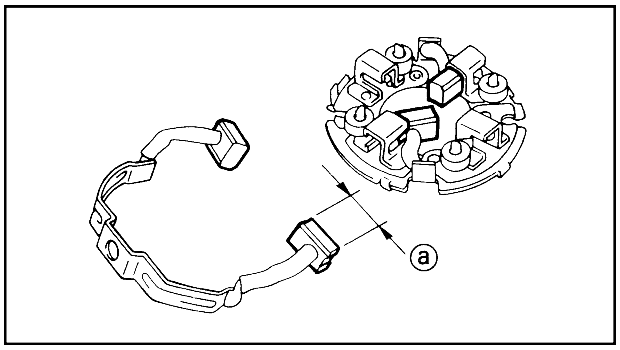
a. Measure the armature assembly resistances with the pocket tester.

	Pocket tester **90890-03112**

	Armature assembly **Armature coil resistance ①** **0.026 ~ 0.034 Ω at 20°C (68 °F)** **Insulation resistance ②** **Above 1 MΩ at 20°C (68 °F)**

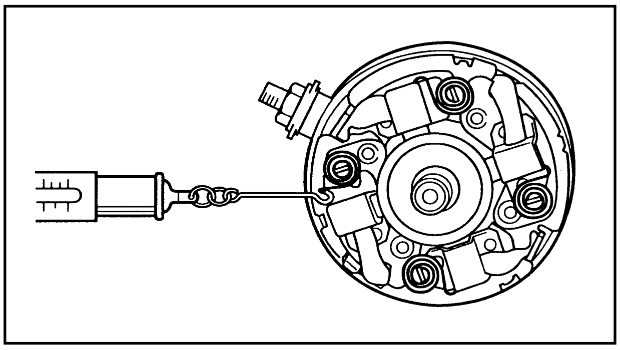
b. If any resistance is out of specification, replace the starter motor.

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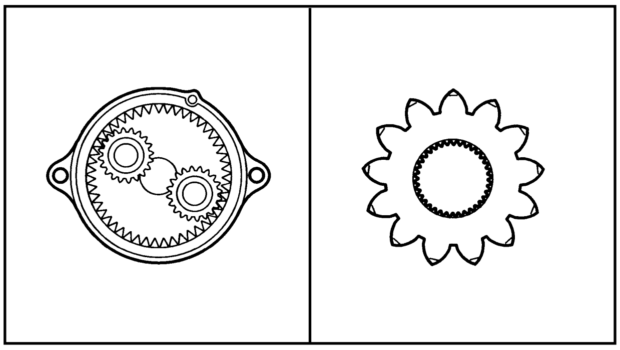
5. Measure:
   - brush length ⓐ
     Out of specification → Replace the brushes as a set.

Min. brush length
5 mm

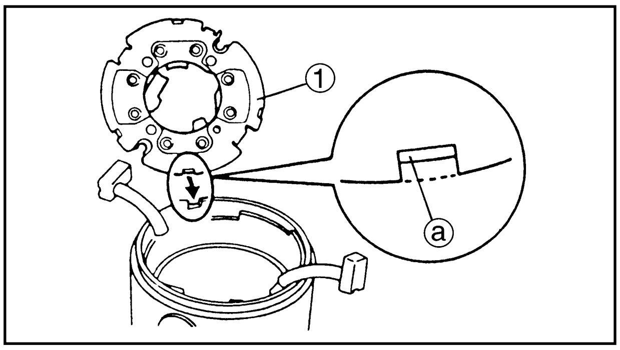


6. Measure:
   - brush spring force
     Out of specification → Replace the brush springs as a set.

Bruch spring force
7.65 ~ 10.01 N (780 ~ 1.020 g)



7. Check:
   - gear teeth
     Damage/wear → Replace the gear.
8. Check:
   - oil seal
     Damage/wear → Replace the defective part(-s).

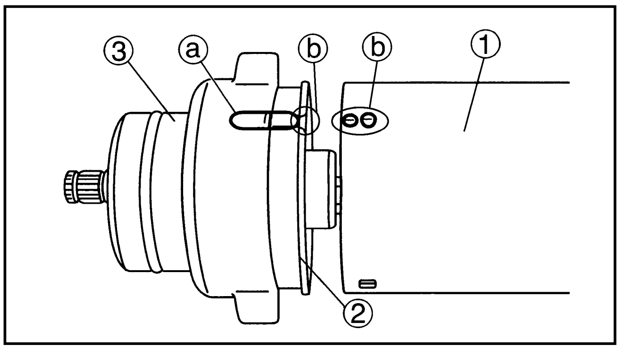


EAS00772

Assembling the starter motor

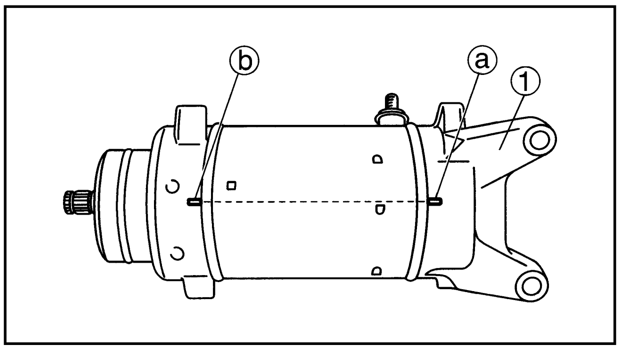
1. Install:
   - brush holder ①

NOTE:
Align the tab ⓐ on the brush holder with the slot in the starter motor rear cover.



2. Install:
   - starter motor yoke ①
   - end bracket ②
   - starter motor front cover ③

NOTE:
Align the projection ⓐ on the front cover with the slot ⓑ on the end cover and starter motor yoke.



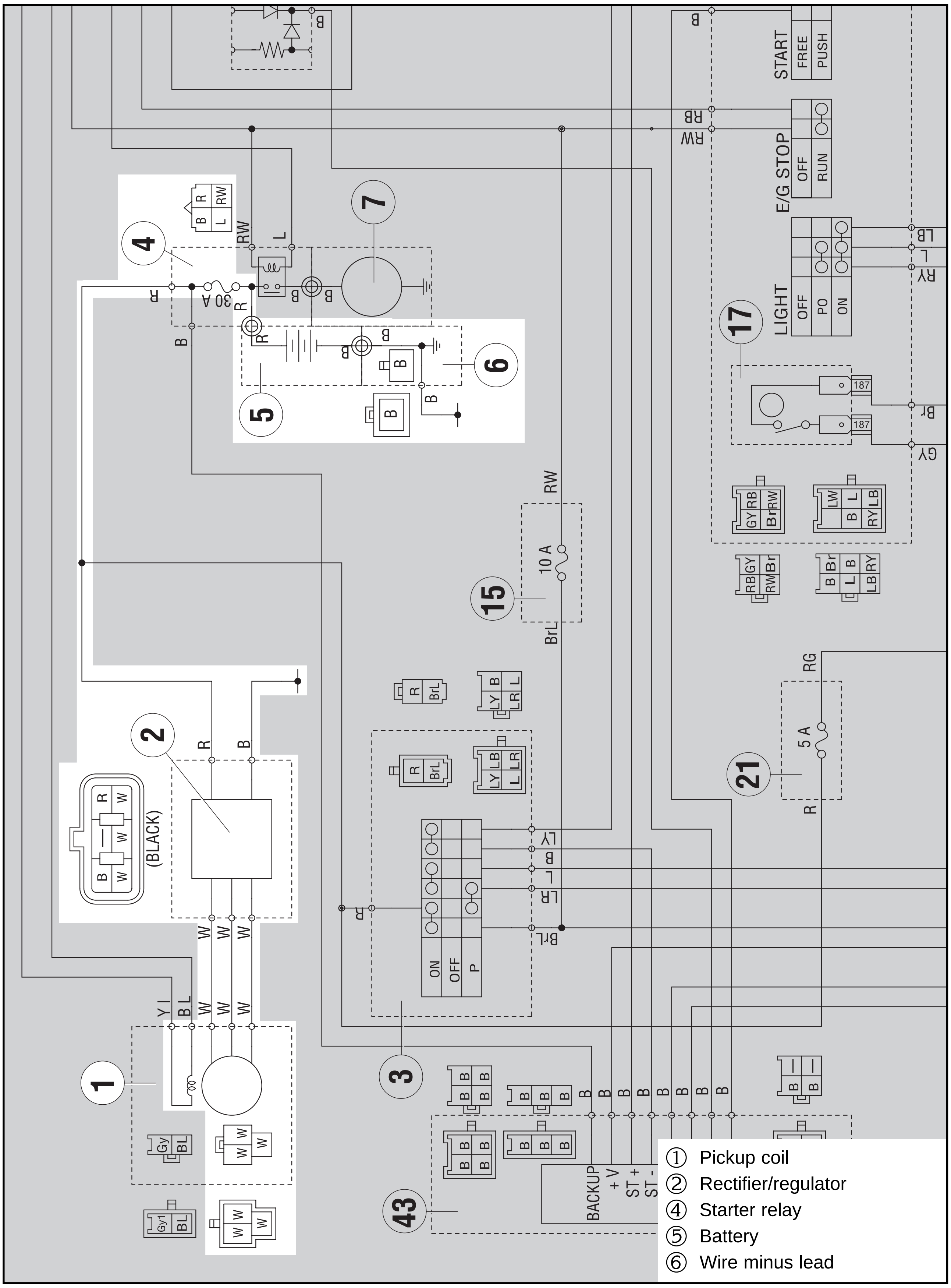
3. Install:
   - starter motor rear cover ①

NOTE:

Align the match marks ⓐ on the rear cover with the match marks ⓑ on the front cover.

CHARGING SYSTEM

CIRCUIT DIAGRAM



① Pickup coil
② Rectifier/regulator
④ Starter relay
⑤ Battery
⑥ Wire minus lead

EAS00774

TROUBLESHOOTING

The battery is not being charged.

Check:
1. main fuse
2. battery
3. charging voltage
4.startor coil assembly resistance
5. wiring (of the entire charging system)

NOTE:
- Before troubleshooting, remove the following part(-s):
1) seat
2) side covers
3) storage compartment/battery cover
- Troubleshoot with the following special tool(-s).

	Engine tachometer **90890-03113** **Pocket tester** **90890-03112**

EAS00738

1. Main fuse

- Check the main fuse for continuity.
  Refer to “CHECKING THE FUSES” in Chapter 3.
- Is the main fuse OK?

YES ↓ / NO ↓

NO: Replace the fuse.

EAS00739

2. Battery

- Check the condition of the battery.
  Refer to “CHECKING AND CHARGING THE BATTERY” in Chapter 3.

Min. open-circuit voltage
12.8 V or more at 20 °C (68 °F)

- Is the battery OK?

YES ↓ / NO ↓

NO:
- Clean the battery terminals.
- Recharge or replace the battery.

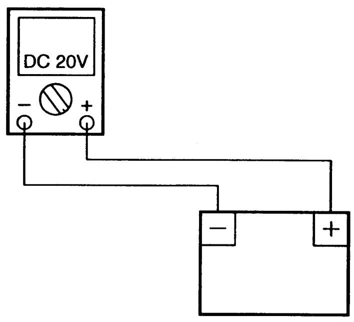
EAS00775

3. Charging voltage

- Connect the engine tachometer to the spark plug lead of cylinder #1.
- Connect the pocket tester (DC 20 V) to the battery as shown.

Tester positive probe →
battery positive terminal

Tester negative probe →
battery negative terminal



- Start the engine and let it run at approximately 5,000 r/min.
- Measure the charging voltage.

Charging voltage
14 V at 5,000 r/min

NOTE:

Make sure that the battery is fully charged.

- Is the charging voltage within specification?

NO ↓ — YES ↓

The charging circuit is OK.

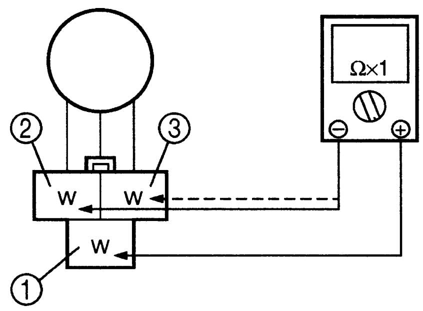
EAS00776

4. Stator coil assembly resistances

- Remove the left side cover.
- Connect the pocket tester (Ω × 1) to the stator coil assembly coupler as shown

Tester positive probe → White ①
Tester negative probe → White ②

Tester positive probe → White ①
Tester negative probe → White ③



- Measure the stator coil assembly resistances.

Stator coil resistance
0.36 ~ 0.44 Ω at 20°C (68 °F)

- Is the stator coil assembly OK?

YES ↓ — NO ↓

Replace the stator coil assembly.

EAS00779

5. Wiring

- Check the wiring connections of the entire charging system.
  Refer to "CIRCUIT DIAGRAM".
- Is the charging system's wiring properly conected and without defects?

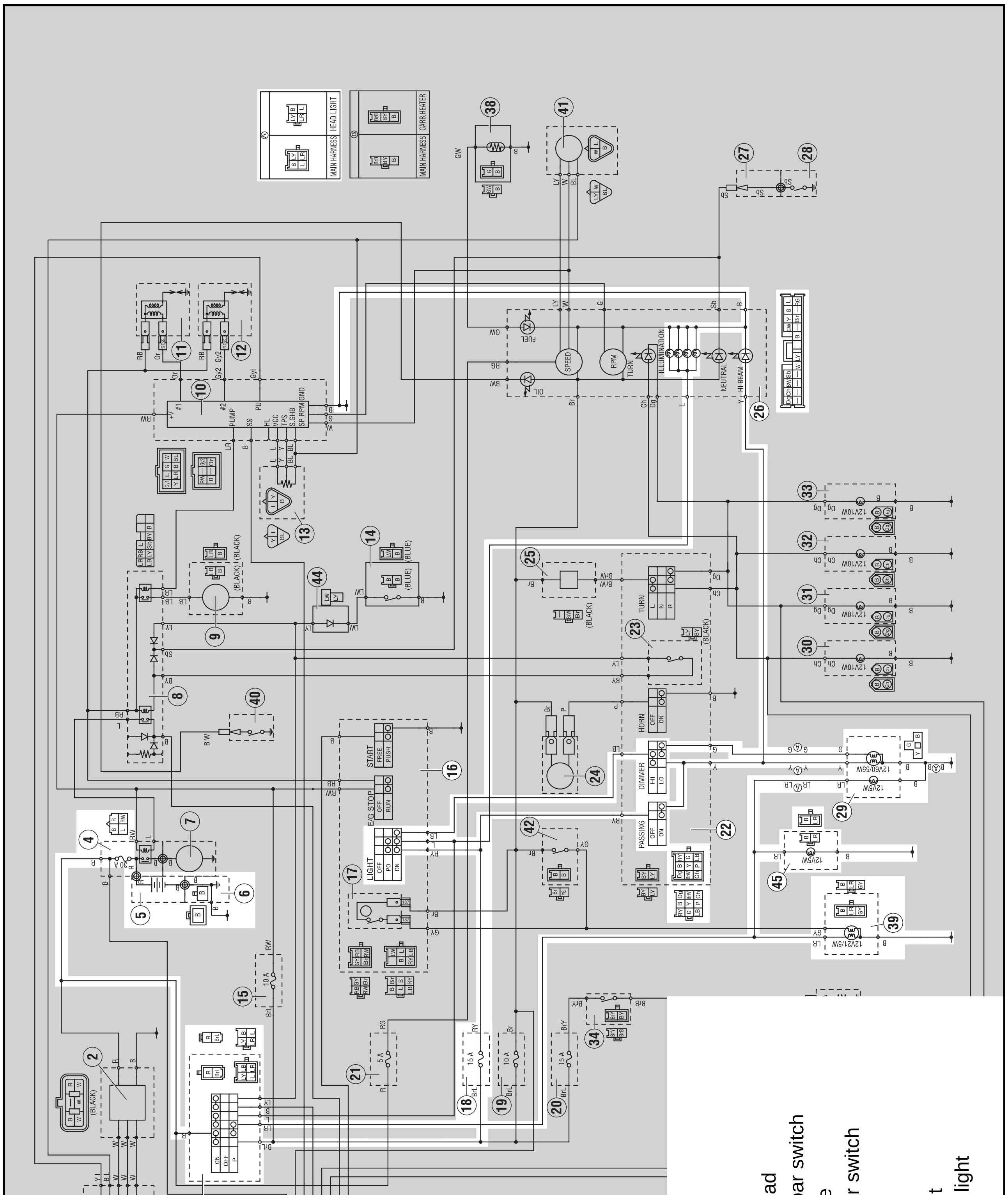
NO ↓ — YES ↓

Properly connect or repair the charging system's wiring.

Replace the rectifier/regulator.

LIGHTING SYSTEM

CIRCUIT DIAGRAM



EASB0033

TROUBLESHOOTING

Any of the following fail to light: headlight, high beam indicator light, license plate light or meter light.

Check:
1. Main and headlight fuses
2. Battery
3. Main switch
4. Lights switch (for europe)
5. Dimmer switch
6. Pass switch
7. Wiring (of the entire charging system)

NOTE:
- Before troubleshooting, remove the following part(-s).

1) seat
2) side covers
3) fuel tank (lift)
4) cowling (lift forward)
5) storage compartment/battery cover

- Troubleshoot with the following special tool(-s).

Pocket tester
90890-03112

EAS00738

1. Main and headlight fuses

- Check the main and headlight fuses for continuity.
  Refer to “CHECKING THE FUSES” in Chapter 3.
- Are the main and headlight fuses OK?

YES ↓ NO ↓

Replace the fuse(-s).

EAS00739

2. Battery

- Check the condition of the battery.
  Refer to “CHECKING AND CHARGING THE BATTERY” in Chapter 3.

Min. open-circuit voltage
12.8 V or more at 20 °C (68 °F)

- Is the battery OK?

YES ↓ NO ↓

- Clean the battery terminals.
- Recharge or replace the battery.

EAS00749

3. Main switch

- Check the main switch for continuity.
  Refer to “CHECKING THE SWITCHES”.
- Is the main switch OK?

YES ↓ NO ↓

Replace the main switch.

EAS00783

4. Lights switch

- Check the lights switch for continuity.
  Refer to “CHECKING THE SWITCHES”.
- Is the lights switch OK?

YES ↓ NO ↓

The lights switch is faulty. Replace the right handlebar switch.

EAS00784

5. Dimmer switch
• Check the dimmer switch for continuity. Refer to "CHECKING THE SWITCHES". • Is the dimmer switch OK?

YES ⇩ — NO ⬇

The dimmer switch is faulty. Replace the right handlebar switch.

EAS00786

6. Pass switch
• Check the pass switch for continuity. Refer to "CHECKING THE SWITCHES". • Is the pass switch OK?

YES ⇩ — NO ⬇

The pass switch is faulty. Replace the right handlebar switch.

EAS00787

7. Wiring
• Check the entire lighting system's wiring. Refer to "CIRCUIT DIAGRAM". • Is the lighting system's wiring properly connected and without defects?

YES ⇩ — NO ⬇

YES: Check the condition of each of the lighting system's circuits. Refer to "CHECKING THE LIGHTING SYSTEM".

NO: Properly connect or repair the lighting system's wiring.

EAS00788

CHECKING THE LIGHTING SYSTEM

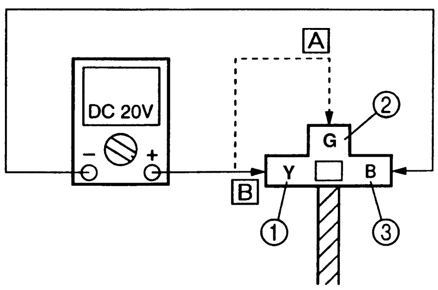
1. The headlight and the high beam indicator light fail to came on.

1. Headlight bulb and socket
• Check the headlight bulb and socket for continuity. Refer to "CHECKING THE BULBS AND BULB SOCKETS". • Are the headlight bulb and socket OK?

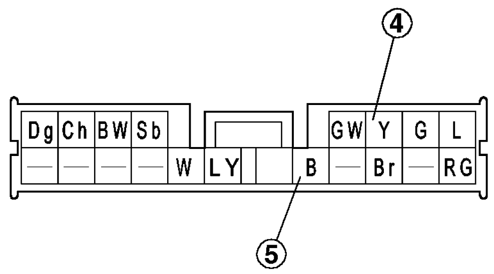
YES ⇩ — NO ⬇

Replace the headlight bulb, socket or both.

2. Voltage
• Connect the pocket tester (DC 20 V) to the headlight and high beam indicator light couplers as shown.
A When the dimmer switch is set to "≣D" B When the dimmer switch is set to "≣D"
Headlight **Tester positive probe → Yellow ① or Green ②** **Tester negative probe → Black ③** **High beam indicator light** **Tester positive probe → Yellow ④** **Tester negative probe → Black ⑤**
Headlight coupler (wire harness side)



• Set the main switch to "ON".
• Set the light switch to "☼".
• Set the dimmer switch to "≣D" or "≣D".



- Measure the voltage (12 V) of Yellow ① or Green ② on the headlight coupler (headlight side).
- Measure the voltage (12V) of Yellow ④ on the meter assembly coupler.
- Is the voltage within specification?

⇩ YES → This circuit is OK.

⬇ NO → The wiring circuit from the main switch to the headlight coupler is faulty and must be repaired.

EAS00789

2. A meter light fails to come on.

1. Meter light bulb and socket.

- Check the meter light bulb and socket for continuity
  Refer to “CHECKING THE BULBS AND BULB SOCKETS”.
- Are the meter light bulb and socket OK?

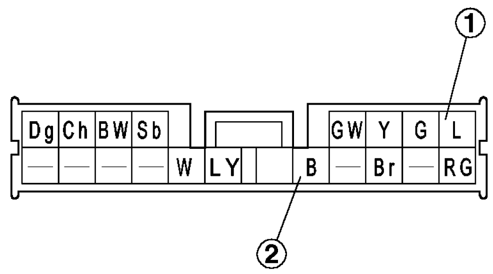
⇩ YES

⬇ NO → Replace the meter light bulb, socket or both.

2. Voltage

- Connect the pocket tester (20 V) to the meter assembly coupler (wire harness side) as shown.

Tester positive probe → Blue ①
Tester negative probe → Black ②



- Set the main switch to “ON”.
- Set the light switch to “≡D0≡” or “-☼-”.
- Measure the voltage (12 V) of Blue ① on the meter assembly coupler (wire harness side).
- Is the voltage within specification?

⇩ YES → This circuit is OK.

⬇ NO → The wiring circuit from the main switch to the meter assembly coupler is faulty and must be repaired.

EAS00790

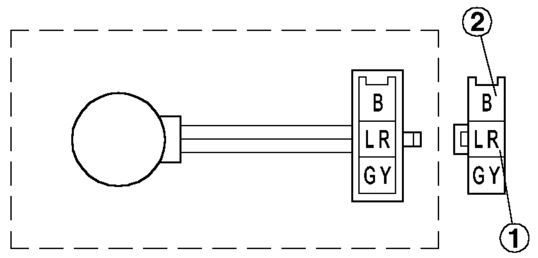
3. A tail/brake light fails to come on.

1. Tail/brake light bulb and socket

- Check the tail/brake light bulb and socket for continuity.
  Refer to “CHECKING THE BULBS AND BULB SOCKETS”.
- Are the tail/brake light bulb and socket OK?

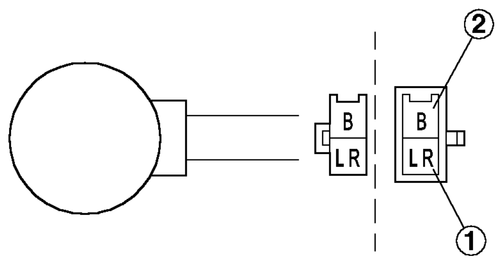
⇩ YES

⬇ NO → Replace the tail/brake light bulb, socket or both.

2. Voltage
• Connect the pocket tester (DC 20 V) to the tail/brake light coupler (wire harness side) as shown.
Tester positive probe → Blue/Red ① **Tester negative probe → Black ②**

• Set the main switch to "ON". • Set the light switch to "≡D0≤" or "☼". • Measure the voltage (12 V) of Blue/Red ① on the tail/brake light coupler (wire harness side). • Is the voltage within specification?

YES → This circuit is OK.

NO → The wiring circuit from the main switch to the tail/brake light coupler is faulty and must be repaired.

2. Voltage
• Connect the pocket tester (DC 20 V) to the license plate light coupler (wire harness side) as shown.
Tester positive probe → Blue/Red ① **Tester negative probe → Black ②**

• Set the main switch to "ON". • Set the light switch to "≡D0≤" or "☼". • Measure the voltage (12 V) of Blue/Red 1 on the license plate light coupler (wire harness side). • Is the voltage within specification?

YES → This circuit is OK.

NO → The wiring circuit from the main switch to the license plate light coupler is faulty and must be re-paired.

EASB0034

4. The license plate light fails to come on.

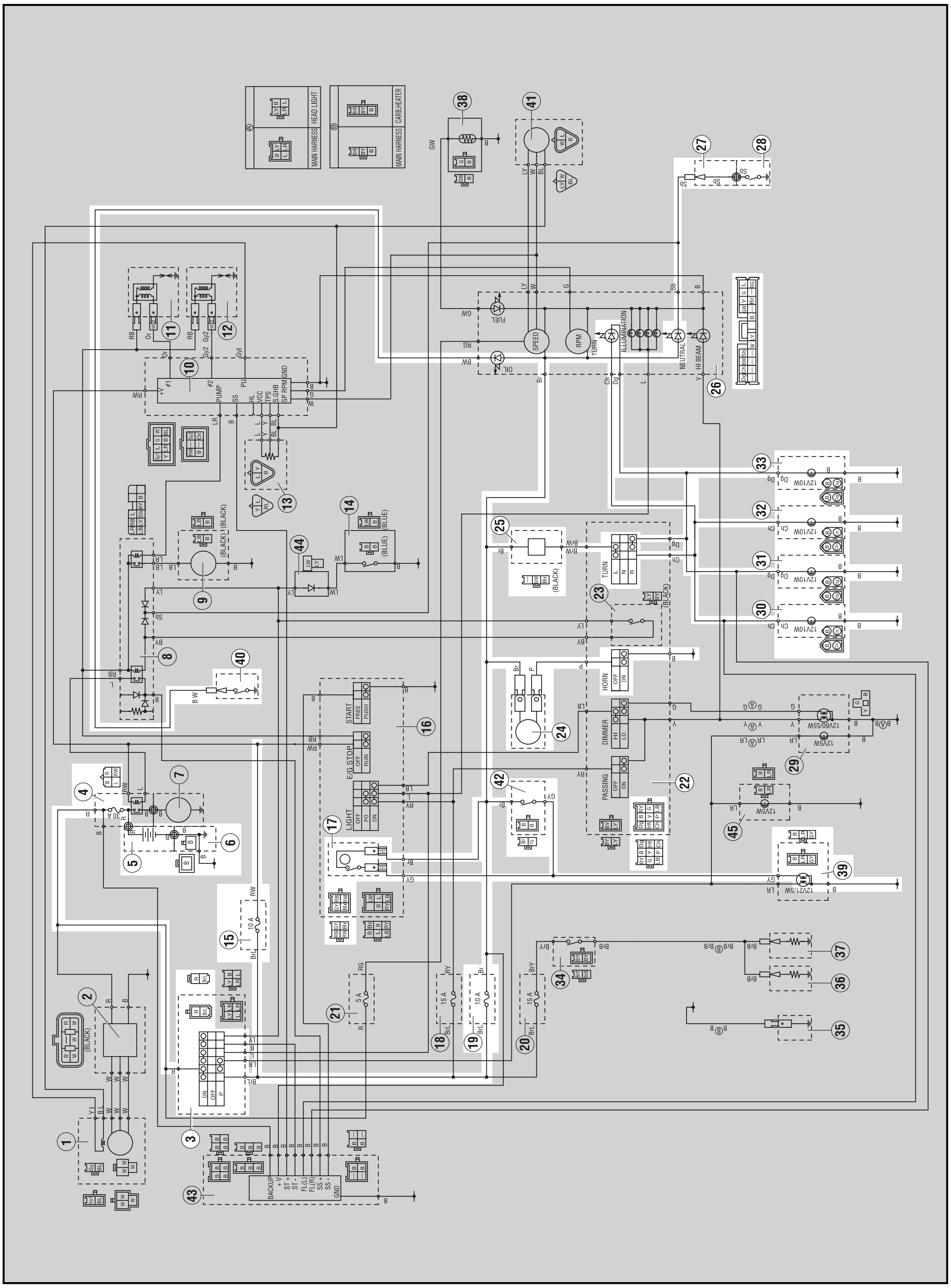
1. License plate light bulb and socket
• Check the license plate light bulb and socket for continuity. Refer to "CHECKING THE BULBS AND BULB SOCKETS". • Are the license plate light bulb and socket OK?

YES

NO → Replace the license plate light bulb, socket or both.

SIGNALING SYSTEM

CIRCUIT DIAGRAM



③ Main switch
④ Starter relay
⑤ Battery
⑥ Wire minus lead
⑮ Ignition fuse
⑰ Front brake switch
⑲ Signal fuse
㉒ Left handlebar switch
㉔ Horn
㉕ Flasher relay
㉖ Speedometer
㉗ Neutral switch lead
㉘ Neutral switch
㉚ Front turn signal light (L)
㉛ Front turn signal light (R)
㉜ Rear turn signal light (L)
㉝ Rear turn signal light (R)
㊴ Tail/brake light
㊵ Oil level gauge
㊷ Rear brake switch

EASB0035

TROUBLESHOOTING

- **Any of the following fail to light: turn signal light, brake light or an indicator light.**
- **The horn fails to sound.**

Check:
1. Main and signaling system fuses
2. Battery
3. Main switch
4. Wiring (of the entrire signaling system)

NOTE:
- Before troubleshooting, remove the following part(-s):

1) seat
2) side covers
3) fuel tank (lift)
4) cowling (lift forward)
5) storage compartment/battery cover

- Troubleshoot with the following special tool(-s).

Pocket tester
90890-03112

EAS00738

1. Main, ignition and signaling system fuses

- Check the main, ignition and signaling system fuses for continuity.
  Refer to "CHECKING THE FUSES" in Chapter 3.
- Are the main, ignition and signaling system fuses OK?

YES ↓ / NO ↓

NO: Replace the fuse(-s).

EAS00739

2. Battery

- Check the condition of the battery.
  Refer to "CHECKING AND CHARGING THE BATTERY" in Chapter 3.

Min. open-circuit voltage
12.8 V or more at 20 °C (68 °F)

- Is the battery OK?

YES ↓ / NO ↓

NO:
- Clean the battery terminals.
- Recharge or replace the battery.

EAS00749

3. Main switch

- Check the main switch for continuity.
  Refer to "CHECKING THE SWITCHES".
- Is the main switch OK?

YES ↓ / NO ↓

NO: Replace the main switch.

EAS00795

4. Wiring

- Check the entire signaling system's wiring.
  Refer to "CIRCUIT DIAGRAM".
- Is the signaling system's wiring properly connected and without defects?

YES ↓ / NO ↓

YES: Check the condition of each of the signaling system's circuits. Refer to "CHECKING THE SIGNALING SYSTEM".

NO: Properly connect or repair the signaling system's wiring.

EAS00796

CHECKING THE SIGNALING SYSTEM

1. The horn fails to sound.

1. Horn switch

- Check the horn switch for continuity.
  Refer to "CHECKING THE SWITCHES".
- Is the horn switch OK?

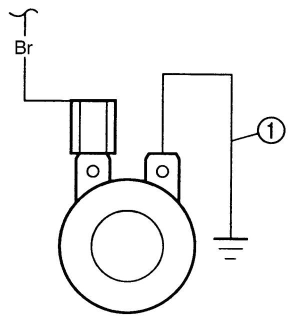
YES ↓ / NO ↓

NO → Replace the left handlebar switch.

2. Voltage

- Connect the pocket tester (DC 20 V) to the horn connector at the horn terminal as shown.

Tester positive probe → Brown ①
Tester negative probe → Ground



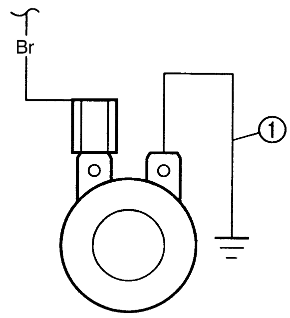
- Set the main switch to "ON".
- Measure the voltage (12 V) of Brown at the horn terminal.
- Is the voltage within specification?

YES ↓ / NO ↓

NO → The wiring circuit from the main switch to the horn connector is faulty and must be repaired.

3. Horn

- Disconnect the Black connector at the horn terminal.
- Connect a jumper lead ① to the horn terminal and Ground the jumper lead.
- Set the main switch to "ON".
- Does the horn sound?



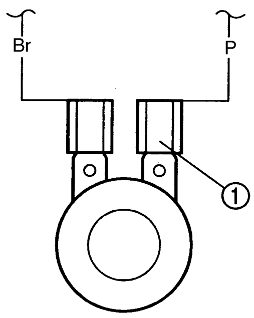
NO ↓ / YES ↓

YES → The horn is OK.

4. Voltage

- Connect the pocket tester (DC 20 V) to the horn connecter at the black terminal as shown.

Tester positive probe → Black ①
Tester negative probe → Ground



- Set the main switch to "ON".
- Measure the voltage (12 V) of Black ① at the horn terminal.
- Is the voltage within specification?

YES ↓ / NO ↓

YES → Repair or replace the horn.

NO → Replace the horn.

EAS00797

2. A tail/brake light fails to come on.

1. Tail/brake light bulb and socket

- Check the tail/brake light bulb and socket for continuity.
  Refer to "CHECKING THE BULBS AND BULB SOCKETS".
- Are the tail/brake light bulb and socket OK?

YES ↓ / NO ↓

NO: Replace the tail/brake lightbulb, socket or both.

2. Brake light switches

- Check the brake light switches for continuity.
  Refer to "CHECKING THE SWITCHES".
- Is the brake light switch OK?

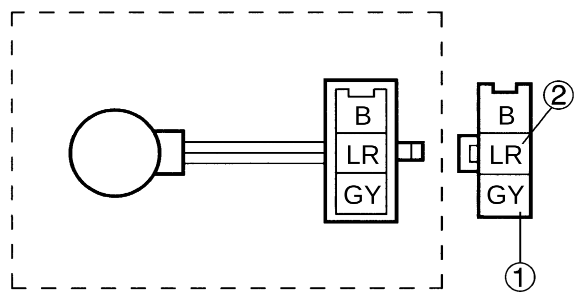
YES ↓ / NO ↓

NO: Replace the brake light switch.

3. Voltage

- Connect the pocket tester (DC 20 V) to the tail/brake light coupler (wire harness side) as shown.

Tester positive probe → Green/Yellow ①
Tester negative probe → Black ②



- Set the main switch to "ON".
- Pull in the brake lever or push down on the brake pedal.
- Measure the voltage (12 V) of Yellow at the tail/brake light coupler (wire harness side).
- Is the voltage within specification?

YES ↓ / NO ↓

YES: This circuit is OK.

NO: The wiring circuit from the main switch to the tail/brake light coupler is faulty and must be repaired.

EAS00799

3. A turn signal light, turn signal indicator light or both fail to blink.

1. Turn signal light bulb and socket

- Check the turn signal light bulb and socket for continuity.
  Refer to "CHECKING THE BULBS AND BULB SOCKETS".
- Are the turn signal light bulb and socket OK?

YES ↓ / NO ↓

NO: Replace the turn signal light bulb, socket or both.

2. Turn signal switch

- Check the turn signal for continuity.
  Refer to "CHECKING THE SWITCHES".
- Is the turn signal switch OK?

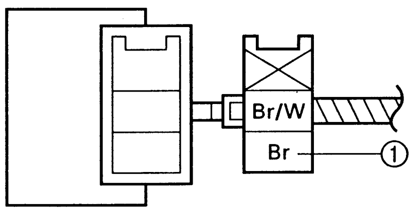
YES ⇩ / NO ⬇

NO: Replace the left handlebar switch.

3. Voltage

- Connect the pocket tester (DC 20 V) to the flasher relay coupler (wire harness side) as shown.

Tester positive probe → Brown ①
Tester negative probe → Ground



- Set the main switch to "ON".
- Measure the voltage (12 V) of Brown ① at the flasher relay coupler (wire harness side).
- Is the voltage within specification?

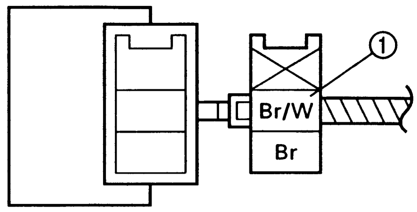
YES ⇩ / NO ⬇

NO: The wiring circuit from the main switch to the flasher relay coupler (flasher relay side) is faulty and must be repaired.

4. Voltage

- Connect the pocket tester (DC 20 V) to the flasher relay coupler (wire harness side) as shown.

Tester positive probe → Brown/White ①
Tester negative probe → Ground



- Set the main switch to "ON".
- Set the turn signal switch to "⇦" or "⇨".
- Measure the voltage (12 V) of Brown/White at the flasher relay coupler (wire harness side).
- Is the voltage within specification?

YES ⇩ / NO ⬇

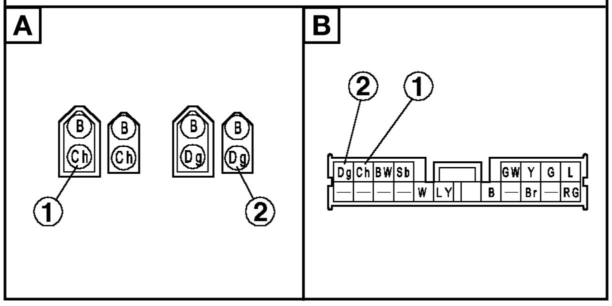
NO: The flasher relay is faulty and must be replaced.

5. Voltage

- Connect the pocket tester (DC 20 V) to the turn signal light connectors or the meter assembly coupler (wire harness side) as shown.

[A] Turn signal light
[B] Turn signal indicator light

Left turn signal light
Tester positive probe → Chocolate ①
Tester negative probe → Ground
Right turn signal light
Tester positive probe → Dark green ②
Tester negative probe → Ground



- Set the main switch to "ON".
- Set the turn signal switch to "⇦" or "⇨".
- Measure the voltage (12 V) of Chocolate ① or Dark green ② at the turn signal light connector (wire harness side).
- Is the voltage within specification?

YES → This circuit is OK.

NO → The wiring circuit from the turn signal switch to the turn signal light connector is faulty and must repaired.

EAS00800

4. The neutral indicator light fails to come on.

1. Neutral indicator light bulb and socket

- Check the neutral indicator light bulb and socket for continuity. Refer to "CHECKING THE BULBS AND BULB SOCKETS".
- Are the neutral indicator light bulb and socket OK?

YES ↓

NO → Replace the neutral indicator light bulb, socket or both.

2. Neutral switch

- Check the neutral switch for continuity. Refer to "CHECKING THE SWITCHES".
- Is the neutral switch OK?

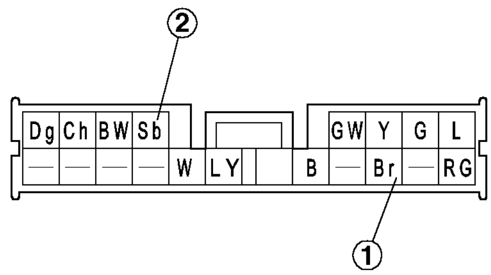
YES ↓

NO → Replace the neutral switch.

3. Voltage

- Connect the pocket tester (DC 20 V) to the meter assembly coupler (wire harness side) as shown.

Tester positive probe → Brown ①
Tester negative probe → Sky blue ②



- Set the main switch to "ON".
- Measure the voltage (12 V) of Brown ① and Sky blue ② at the meter assembly coupler.
- Is the voltage within specification?

YES → This circuit is OK.

NO → The wiring circuit from the main switch to the meter light bulb coupler is faulty and must be repaired.

EASB0036

5. The oil level warning light fails to come on.

1. Oil level warning light bulb and socket

- Check the oil level warning light bulb and socket for continuity. Refer to "CHECKING THE BULBS AND BULB SOCKETS"
- Are the oil level warning light bulb and socket OK?

YES ↓

NO → Replace the oil level warning light bulb, socket or both.

2. Oil level switch

- Drain the engine oil and remove the oil level switch from the oil pan.
- Check the oil level switch for continuity. Refer to “CHECKING THE SWITCHES”.
- Is the oil level switch OK?

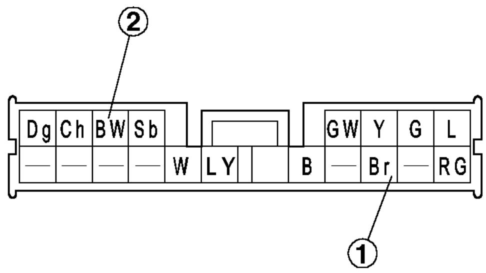
YES ↓ NO ↓

Replace the oil level switch.

3. Voltage

- Connect the pocket tester (DC 20 V) to the meter assembly coupler (wire harness side) as shown.

Tester positive probe → Red/White ①
Tester negative probe → Black/White ②



- Set the main switch to “ON”.
- Measure the voltage (12 V) of Brown ① and Black/White ② at the meter assembly coupler.
- Is the voltage within specification?

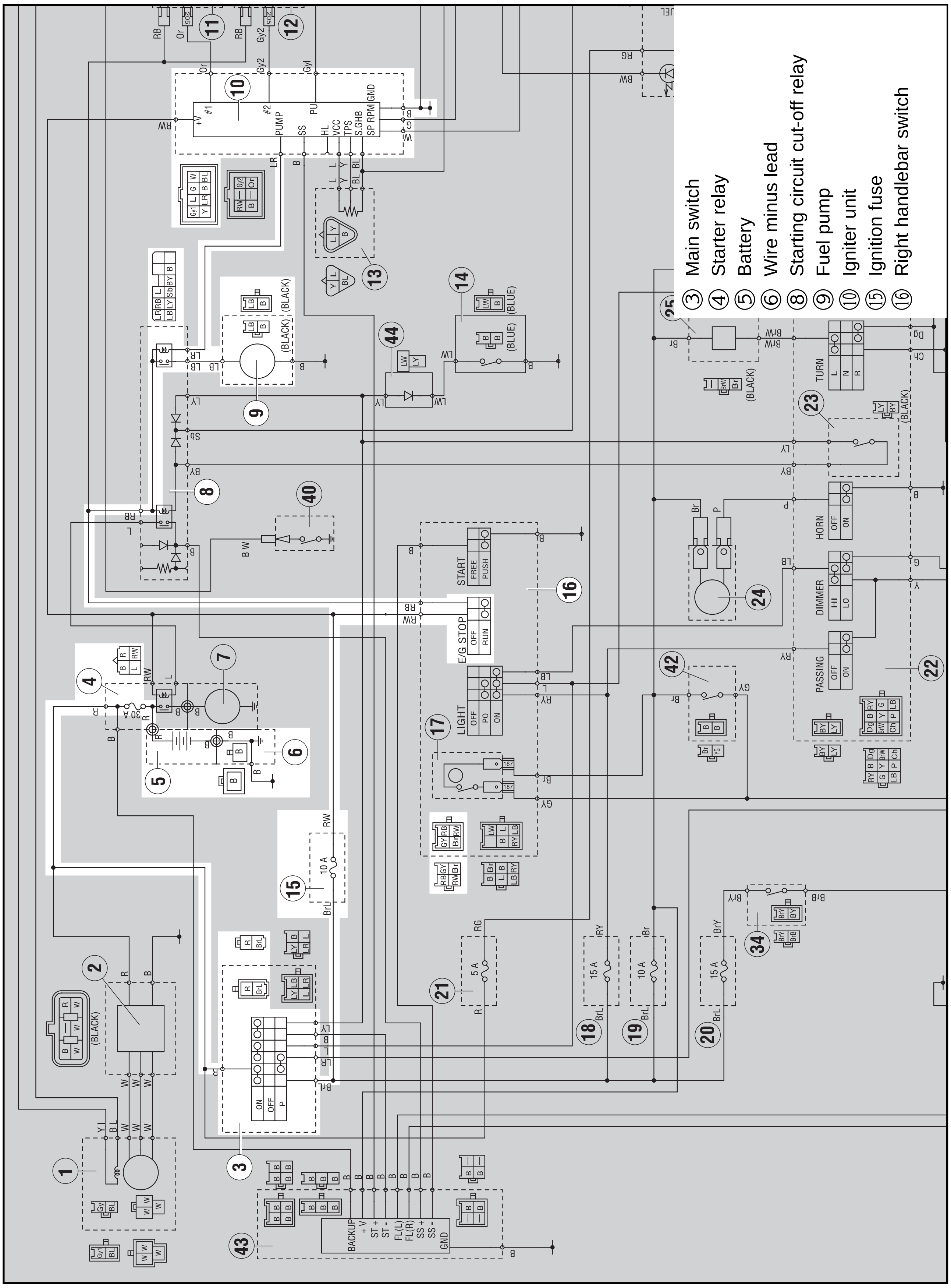
YES ↓ NO ↓

This circuit is OK.

The wiring circuit from the main switch to the meter assembly coupler is faulty and must be repaired.

FUEL PUMP SYSTEM

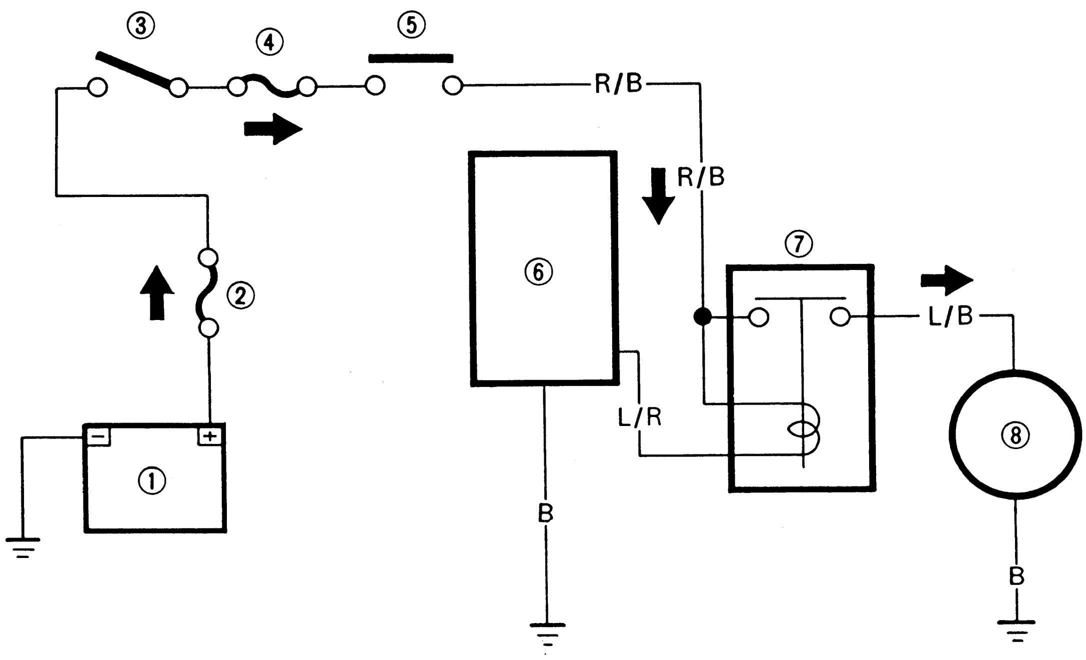
CIRCUIT DIAGRAM



EB808010
FUEL PUMP CIRCUIT OPERATION

The fuel pump circuit consists of the fuel pump relay, fuel pump, engine stop switch and ignitor unit. The ignitor unit includes the control unit for the fuel pump.

① Battery
② Main fuse
③ Main switch
④ Ignition fuse
⑤ Engine stop switch
⑥ Ignitor unit
⑦ Fuel pump relay
⑧ Fuel pump



EASB0037

TROUBLESHOOTING

The fuel pump fails to operate.

Check:
1. Main, and ignition fuses
2. Battery
3. Main switch
4. Engine stop switch
5. Starting circuit cutoff relay (fuel pump relay)
6. Fuel pump
7. Wiring (of the entire charging system)

NOTE:
- Before troubleshooting, remove the following part(-s):
1) seat
2) side covers
3) fuel tank (lift)
4) storage compartment/battery cover
- Troubleshoot with the following special tool(-s).

Pocket tester
90890-03112

EAS00738

1. Main and ignition fuses
- Check the main and ignition fuses for continuity.
  Refer to "CHECKING THE FUSES" in Chapter 3.
- Are the main and ignition fuses OK?

YES ⇩ / NO ⬇ → Replace the fuse(-s).

EAS00739

2. Battery
- Check the condition of the battery.
  Refer to "CHECKING AND CHARGING THE BATTERY" in Chapter 3.

Open-circuit voltage
12.8 V or more at 20 °C (68 °F)

- Is the battery OK?

YES ⇩ / NO ⬇ →
- Clean the battery terminals.
- Recharge or replace the battery.

EAS00749

3. Main switch
- Check the main switch for continuity.
  Refer to "CHECKING THE SWITCHES".
- Is the main switch OK?

YES ⇩ / NO ⬇ → Replace the main switch.

EAS00750

4. Engine stop switch
- Check the engine stop switch for continuity.
  Refer to "CHECKING THE SWITCHES".
- Is the engine stop switch OK?

YES ⇩ / NO ⬇ → Replace the right handlebar switch.

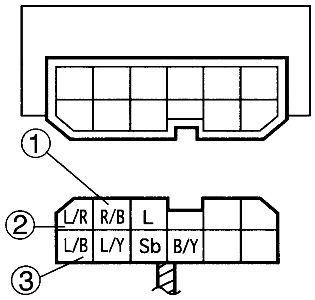
EB803023

5. Starting circuit cutoff relay (fuel pump relay)

- Remove the relay unit from the wire harness.
- Connect the pocket tester (Ω × 1) and battery (12 V) to the relay unit terminals.

Battery (+) terminal → Red/Black terminal ①
Battery (–) terminal → Blue/Red terminal ②

Tester (+) lead → Red/Black terminal ①
Tester (–) lead → Blue/Black terminal ③



- Does the fuel pump relay have continuity between Red/Black and Blue/Black?

YES ↓ — NO ↓

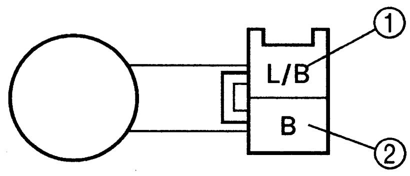
NO: Replace the starting circuit cutoff relay.

EB808021

6. Fuel pump resistance

- Disconnect the fuel pump coupler from the wire harness.
- Connect the pocket tester (Ω × 1) to the fuel pump coupler terminals.

Tester (+) lead → Blue/Black terminal ①
Tester (–) lead → Black terminal ②



- Measure the fuel pump resistance.

Fuel pump resistance:
1.6 ~ 2.2 Ω at 20 °C (68 °F)

Is the fuel pump OK?

YES ↓ — NO ↓

NO: Replace the fuel pump.

7. Wiring

- Check the entire fuel pump system's wiring. Refer to "CIRCUIT DIAGRAM".
- Is the fuel pump system's wiring properly connected and without defects?

NO ↓ — YES ↓

Properly connect or repair the fuel pump system's wiring.

YES: Replace the ignitor unit.

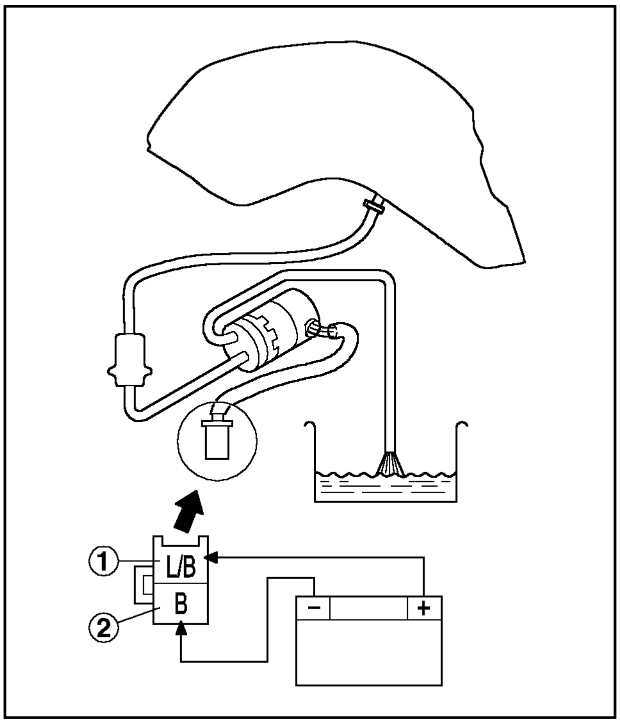
EASB0038

FUEL PUMP TEST

⚠ WARNING

Gasoline is extremely flammable and under certain circumstances there can be a danger of an explosion or combustion. Be extremely careful and note the following points:

- **Stop the engine before refuelling.**
- **Do not smoke and keep away from open flames, sparks, or any other source of fire.**
- **Take care not to spill gasoline. If you do accidentally spill some, wipe it up immediately with dry rags.**
- **If gasoline touches the engine when the engine is still hot, there is a danger of combustion. Make sure that the engine is completely cool before performing the following test.**



1. Check:
   - Fuel pump operation

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a. Fill up the fuel tank.
b. Put the end of the fuel hose into an open container.
c. Connect the battery (12 V) to the fuel pump coupler terminals.

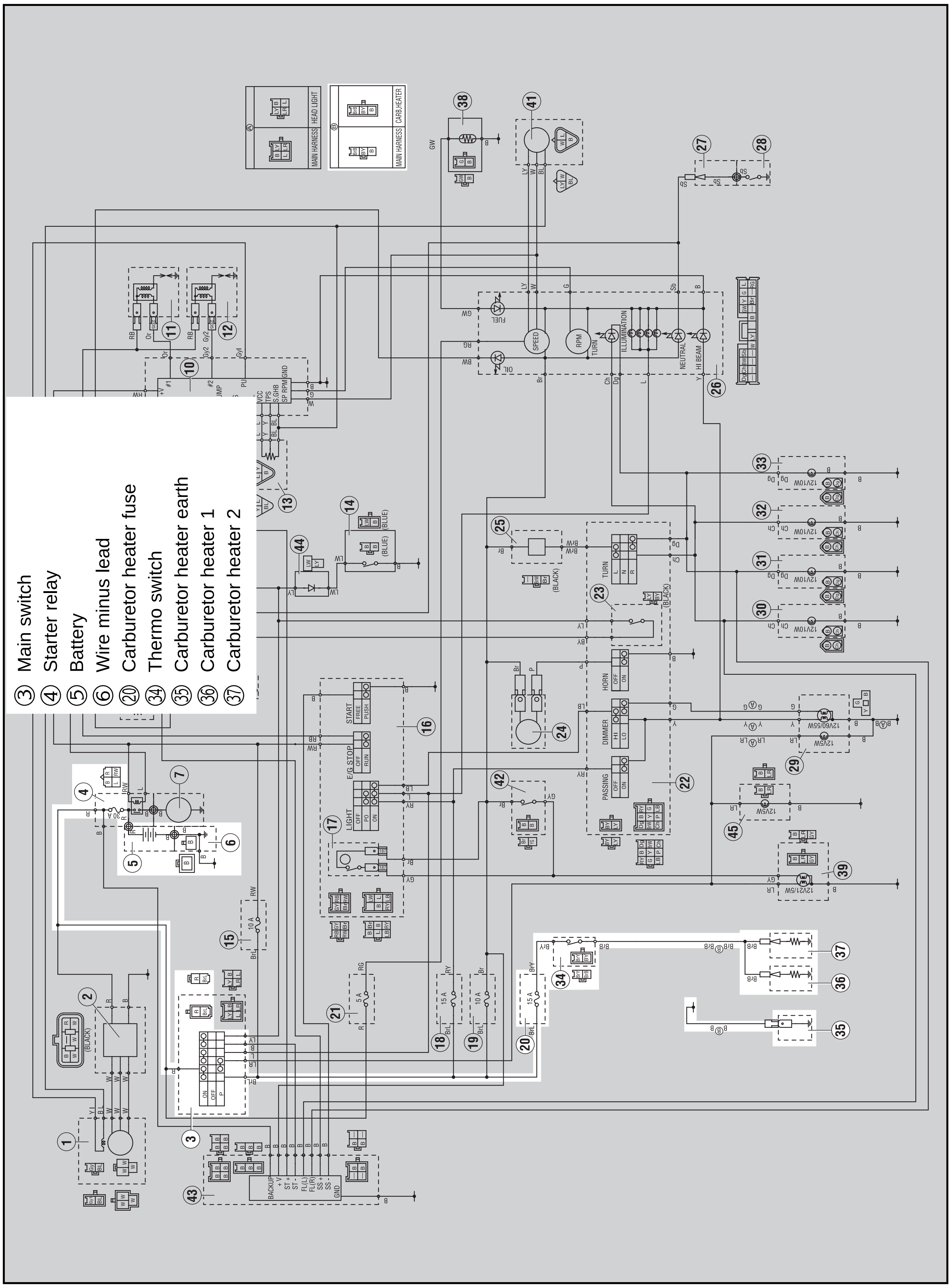
Battery (+) lead → Blue/Black terminal ① **Battery (–) lead → Black terminal ②**

d. Operate the engine starter to open the vacuum fuel cock.
e. If fuel flows out from the fuel hose, the fuel pump is good. If not, replace the fuel pump assembly.

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CARBURETOR HEATER SYSTEM

CIRCUIT DIAGRAM



EASB0039
TROUBLESHOOTING

The carburetor heater fails to operate.

Check:
1. Main, and carburetor heater
2. Battery
3. Main switch
4. Thermo
5. Carburetor heater
6. Wiring (of the entire charging system

NOTE:
- Before troubleshooting, remove the following part(-s):
1) seat
2) side covers
3) fuel tank (lift)
4) storage compartment/battery cover
- Troubleshoot with the following special tool(-s).

Pocket tester
90890-03112

EAS00738

1. Main and carburetor heater fuses

- Check the main and carburetor heater fuses for continuity.
  Refer to "CHECKING THE FUSES" in Chapter 3.
- Are the main, and carburetor heater fuses OK?

YES ⇩ | NO ⬇

Replace the fuse(-s).

EAS00739

2. Battery

- Check the condition of the battery.
  Refer to "CHECKING AND CHARGING THE BATTERY" in Chapter 3.

Open-circuit voltage
12.8 V or more at 20 °C (68 °F)

- Is the battery OK?

YES ⇩ | NO ⬇

- Clean the battery terminals.
- Recharge or replace the battery.

EAS00749

3. Main switch

- Check the main switch for continuity.
  Refer to "CHECKING THE SWITCHES".
- Is the main switch OK?

YES ⇩ | NO ⬇

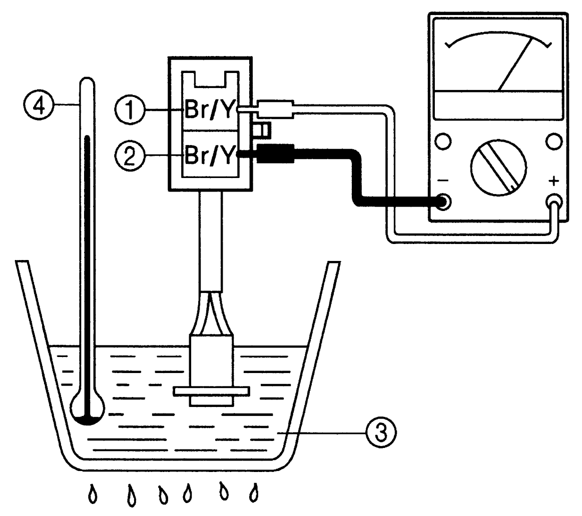
Replace the main switch.

EASB0040

4. Thermo switch

- Remove the thermo switch from the thermo switch plate.
- Connect the pocket tester to the thermo switch lead.

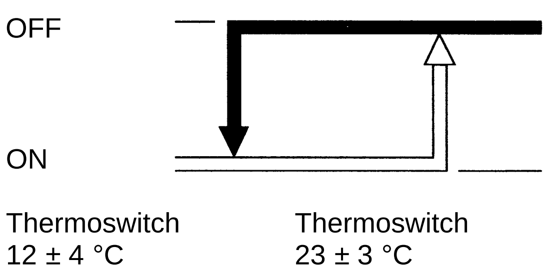
Tester (+) lead →
Brown/Yellow terminal ①
Tester (–) lead →
Black/Yellow terminal ②



- Immerse the thermo switch in the water ③.
- Check the thermo switch for continuity. Note the temperatures while heating the water with the temperature gauge ④.

Test step	Water temperature	Good condition
1	**Less than 23 ± 3 °C**	O
2	**More than 23 ± 3 °C**	×
3	**More than 12 ± 4 °C**	×
4	**Less than 12 ± 4 °C**	O

Test 1 & 2: Heat-up test
Test 3 & 4: Cool-down test
O **: Continuity** × **: No continuity**



- Is the thermo switch OK?

YES ⇩ | NO ⬇

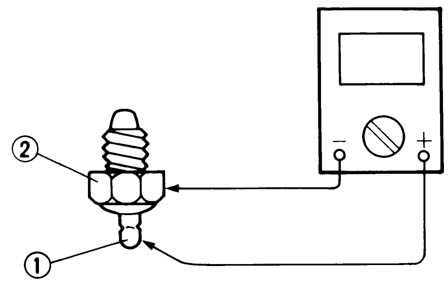
Replace the thermo switch.

EASB0041

5. Carburetor heater

- Remove the carburetor heater from the carburetor body.
- Connect the pocket tester to the carburetor heater.

Tester (+) lead → Heater terminal ①
Tester (–) lead → Heater body ②



- Measure the heater resistance.

Carburetor heater resistance:
12 V 30 W: 6 ~ 10 Ω at 20 °C (68 °F)

- Is the carburetor heater OK?

YES ⇩ | NO ⬇

Replace the carburetor heater.

EASB0042

6. Wiring

- Check the entire carburetor heater system's wiring.
  Refer to "CIRCUIT DIAGRAM".
- Is the carburetor heater system's wiring properly connected and without defects?

NO ⬇ | YES ⇩

Properly connect or repair the carburetor heater system's wiring.

The carburetor heater system circuit is OK.

EASB0043

SELF-DIAGNOSIS

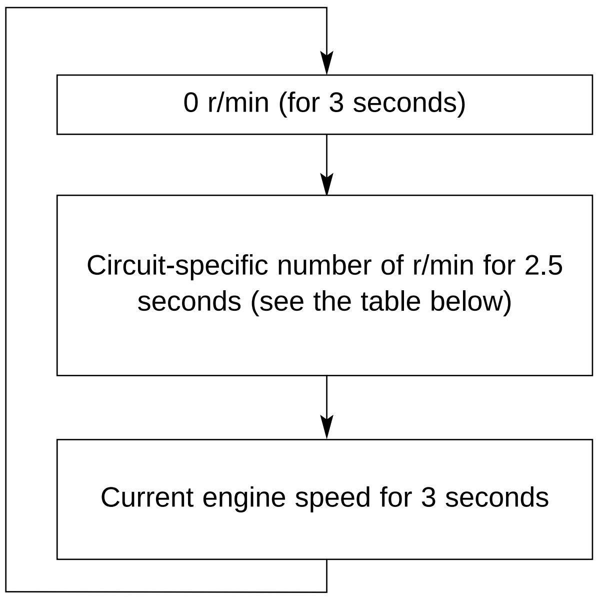
This model is equipped with a self-diagnosis device for the following electrical circuits:
- tachometer
- speedometer
- oil level warning light
- fuel level warning light
- throttle position sensor
- speed sensor.

When the key is turned to "ON", the tachometer and speedometer needles should move to the maximum, then back to zero.

In addition, the oil level warning light and fuel level warning light should come on for a few seconds, then go off.

If the tachometer or speedometer needle does not move as described or either of the warning lights does not come on, check the electrical circuits.

If the throttle position sensor or speed sensor are defective, the tachometer will repeatedly display the following error code:



Use the chart below to identify the faulty electrical circuit.

Specific r/min	Faulty electrical circuit
3,000 r/min	Throttle position sensor
4,000 r/min	Speed sensor

When the tachometer displays the error code check the throttle position sensor or speed sensor as described in the following pages.

EASB0044

TROUBLESHOOTING

The tachometer displays the throttle position sensor/speed sensor error code.

Check:
1. throttle position sensor
2. speed sensor

NOTE:

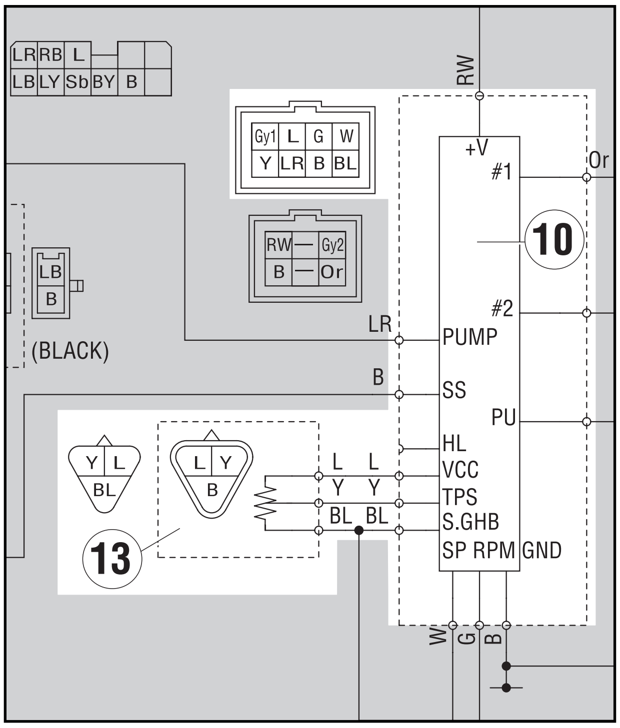
- Before troubleshooting, remove the following part(-s):
1) seat
2) side cover (left)
3) fuel tank (lift)
4) air filter case
- Troubleshoot with the following special tool(-s).

	Pocket tester **90890-03112**

EAS00836

1. Throttle position sensor

CIRCUIT DIAGRAM



⑩ Ignitor unit
⑬ Throttle position sensor

1. Wire harness
• Check the wire harness for continuity. Refer to "CIRCUIT DIAGRAM". • Is the wire harness OK?

YES ⇩ — NO ⬇

Repair or replace the wire harness. (NO)

EB812401

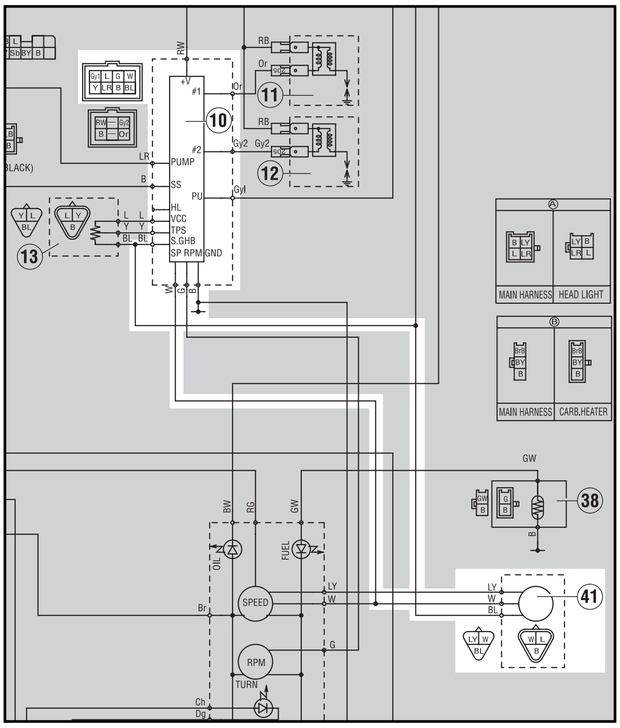
2. Throttle position sensor
• Check the throttle position sensor for continuity. Refer to "CHECKING AND ADJUSTING THE THROTTLE POSITION SENSOR" in Chapter 5. • Is the throttle position sensor OK?

YES ⇩ — NO ⬇

YES	NO
Replace the ignitor unit.	Replace the throttle position sensor.

2. Speed sensor

CIRCUIT DIAGRAM



⑩ Ignitor unit

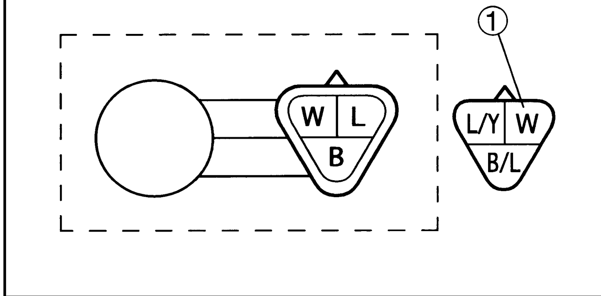
㊶ Speed sensor

1. Wire harness
• Check the wire harness for continuity. Refer to "CIRCUIT DIAGRAM". • Is the wire harness OK?

YES ↓   NO ↓

Repair or replace the wire harness.

2. Speed sensor
• Place the motorcycle on a suitable stand so that the rear wheel is elevated. • Connect the pocket tester (DC 20 V) to the speed sensor connector.
Tester (+) lead → White terminal ① **Tester (–) lead → Body earth**



• Set the main switch to "ON".
• Turn the rear wheel slowly.
• Check the tester voltage (0 V ~ 5 V ~ 0 V).
• Is the speed sensor OK?

YES ↓   NO ↓

Replace the ignitor unit.	Replace the speed sensor.

?

TRBL SHTG

8

CHAPTER 8.
TROUBLESHOOTING

EB900000

TROUBLESHOOTING

NOTE:

The following guide for troubleshooting does not cover all the possible causes of problems. It should be helpful, however, as a guide to troubleshooting. Refer to the relative procedure in this manual for inspection, adjustment and replacement of parts.

STARTING FAILURE/HARD STARTING

FUEL SYSTEM

Fuel tank
- Empty
- Clogged fuel filter
- Clogged fuel strainer
- Clogged fuel tank drain hose
- Clogged roll-over valve
- Clogged roll-over valve breather hose
- Deteriorated or contaminated fuel

Fuel cock
- Clogged fuel hose

Carburetor
- Deteriorated or contaminated fuel
- Clogged pilot jet
- Clogged pilot air passage
- Sucked-in air
- Deformed float
- Worn needle valve
- Improperly sealed valve seat
- Improperly adjusted fuel level
- Improperly set pilot jet
- Clogged starter jet
- Faulty starter plunger
- Improperly adjusted starter cable

Air filter
- Clogged air filter element

Fuel pump
- Faulty fuel pump
- Faulty relay unit (fuel pump relay)

ELECTRICAL SYSTEM

Spark plug
- Improper plug gap
- Worn electrodes
- Wire between terminals severed
- Improper heat range
- Faulty spark plug cap

Ignition coil
- Broken or shorted primary/secondary
- Faulty spark plug lead
- Broken body

Full-transistor system
- Faulty ignitor unit
- Faulty pickup coil

Switch and wiring
- Faulty main switch
- Faulty engine stop switch
- Broken or shorted wiring
- Faulty neutral switch
- Faulty start switch
- Faulty sidestand switch
- Faulty clutch switch

Starter motor
- Faulty starter motor
- Faulty starter relay
- Faulty relay unit (starting circuit cut-off relay)
- Faulty starter clutch

COMPRESSION SYSTEM

Cylinder and cylinder head
- Loose spark plug
- Loose cylinder head or cylinder
- Faulty cylinder head gasket
- Worn, damaged or seized cylinder
- Improperly sealed valve
- Improper valve-to-valve seat contact
- Improper valve timing
- Faulty valve spring

Piston and piston ring
- Improperly installed piston ring
- Worn, fatigued or broken piston ring
- Seized piston ring
- Seized or damaged piston

Crankcase and crankshaft
- Improperly seated crankcase
- Seized crankshaft

EB901000

POOR IDLE SPEED PERFORMANCE

POOR IDLE SPEED PERFORMANCE

Carburetor
- Improperly returned starter plunger
- Loose pilot jet
- Clogged pilot air jet
- Improperly synchronized carburetors
- Improperly adjusted idle speed (throttle stop screw)
- Improper throttle cable free play
- Flooded carburetor

Electrical system
- Faulty battery
- Faulty spark plug
- Faulty ignitor unit
- Faulty pickup coil
- Faulty ignition coil

Valve train
- Improperly adjusted valve clearance

Air filter
- Clogged air filter element

EB902000

POOR MEDIUM-AND HIGH-SPEED PERFORMANCE

POOR MEDIUM-AND HIGH-SPEED PERFORMANCE

Refer to “STARTING FAILURE/HARD STARTING” (fuel system, electrical system, compression system and valve train).

Carburetor
- Faulty diaphragm
- Improperly adjusted fuel level
- Clogged or loose main jet

Air filter
- Clogged air filter element

Fuel pump
- Faulty fuel pump

EB903000

FAULTY GEAR SHIFTING

HARD SHIFTING

Refer to "CLUTCH DRAGGING".

SHIFT PEDAL DOES NOT MOVE

Shift shaft
- Improperly adjusted shift pedal link
- Bent shift shaft

Shift cam, shift fork
- Groove jammed with impurities
- Seized shift fork
- Bent shift fork guide bar

Transmission
- Seized transmission gear
- Jammed impurities
- Incorrectly assembled transmission

JUMPS-OUT-OF GEAR

Shift shaft
- Improperly adjusted shift lever position
- Improperly returned stopper lever

Shift fork
- Worn shift fork

Shift cam
- Improper thrust play
- Worn shift cam groove

Transmission
- Worn gear dog

EB904000

CLUTCH SLIPPING/DRAGGING

CLUTCH SLIPPING

Clutch
- Improperly adjusted clutch cable
- Loose clutch spring
- Fatigued clutch spring
- Worn friction plate/clutch plate
- Incorrectly assembled clutch

Engine oil
- Improper oil level
- Improper viscosity (low)
- Deterioration

CLUTCH DRAGGING

Clutch
- Warped pressure plate
- Unevenly tensioned clutch springs
- Bent push rod
- Broken clutch boss
- Burnt primary driven gear bushing
- Bent clutch plate
- Swollen friction plate
- Match marks not aligned

Engine oil
- Improper oil level
- Improper viscosity (high)
- Deterioration

EB905000

OVERHEATING

OVERHEATING

Ignition system
- Improper spark plug gap
- Improper spark plug heat range
- Faulty ignitor unit

Fuel system
- Improper carburetor main jet setting
- Improper fuel level
- Clogged air filter element

Compression system
- Heavy carbon build-up

Engine oil
- Improper oil level
- Improper oil viscosity
- Inferior oil quality

Brake
- Brake drag

EB906001

FAULTY BRAKE

POOR BRAKING PERFORMANCE

Disc brake
- Worn brake pad
- Worn disc
- Air in brake fluid
- Leaking brake fluid
- Faulty cylinder kit cup
- Faulty caliper kit seal
- Loose union bolt
- Broken brake hose
- Oily or greasy disc/brake pad
- Incorrect brake fluid level

EB907000

FRONT FORK OIL LEAKAGE AND FRONT FORK MALFUNCTION

MALFUNCTION
- Bent, deformed or damaged inner tube
- Bent or deformed outer tube
- Damaged fork spring
- Worn or damaged slide metal
- Bent or damaged damper rod
- Improper oil viscosity
- Improper oil level

OIL LEAKAGE
- Bent, damaged or rusty inner tube
- Damaged or cracked outer tube
- Damaged oil seal lip
- Improperly installed oil seal
- Improper oil level (too high)
- Loose damper rod holding bolt
- Broken cap bolt O-ring
- Loose drain bolt
- Damaged drain bolt gasket

EB908000

UNSTABLE HANDLING

UNSTABLE HANDLING

Handlebar
- Improperly installed or bent

Steering
- Improperly installed handlebar crown
- Bent steering stem
- Improperly installed steering shaft (improperly tightened ring nut)
- Damaged ball bearing or bearing race

Swingarm
- Worn bearing or bushing
- Bent or damaged

Rear Shock absorber
- Faulty spring
- Oil and gas leakage

Tire
- Uneven tire pressures on both sides
- Incorrect tire pressure
- Uneven tire wear

Front fork
- Uneven oil levels on both sides
- Uneven spring tension (uneven damping force adjuster position)
- Broken spring
- Twisted front fork

Wheel
- Incorrect wheel balance
- Deformed cast wheel
- Damaged bearing
- Bent or loose wheel axle
- Excessive wheel runout

Frame
- Bent
- Damaged steering head tube
- Improperly installed bearing race

EB909000

FAULTY LIGHTING AND SIGNAL SYSTEMS

HEADLIGHT DOES NOT LIGHT
- Improper bulb
- Too many electric accessories
- Hard charging (broken stator coil wire, faulty rectifier/regulator)
- Incorrect connection
- Improperly grounded
- Poor contacts (main or lights switch)
- Bulb life expired

FLASHER DOES NOT LIGHT
- Improperly grounded
- Discharged battery
- Faulty turn switch
- Faulty flasher relay
- Faulty wire harness
- Loosely connected coupler
- Burnt-out bulb
- Faulty fuse

FLASHER BLINKS SLOWLY
- Faulty flasher relay
- Faulty main and/or turn switch
- Improper bulb

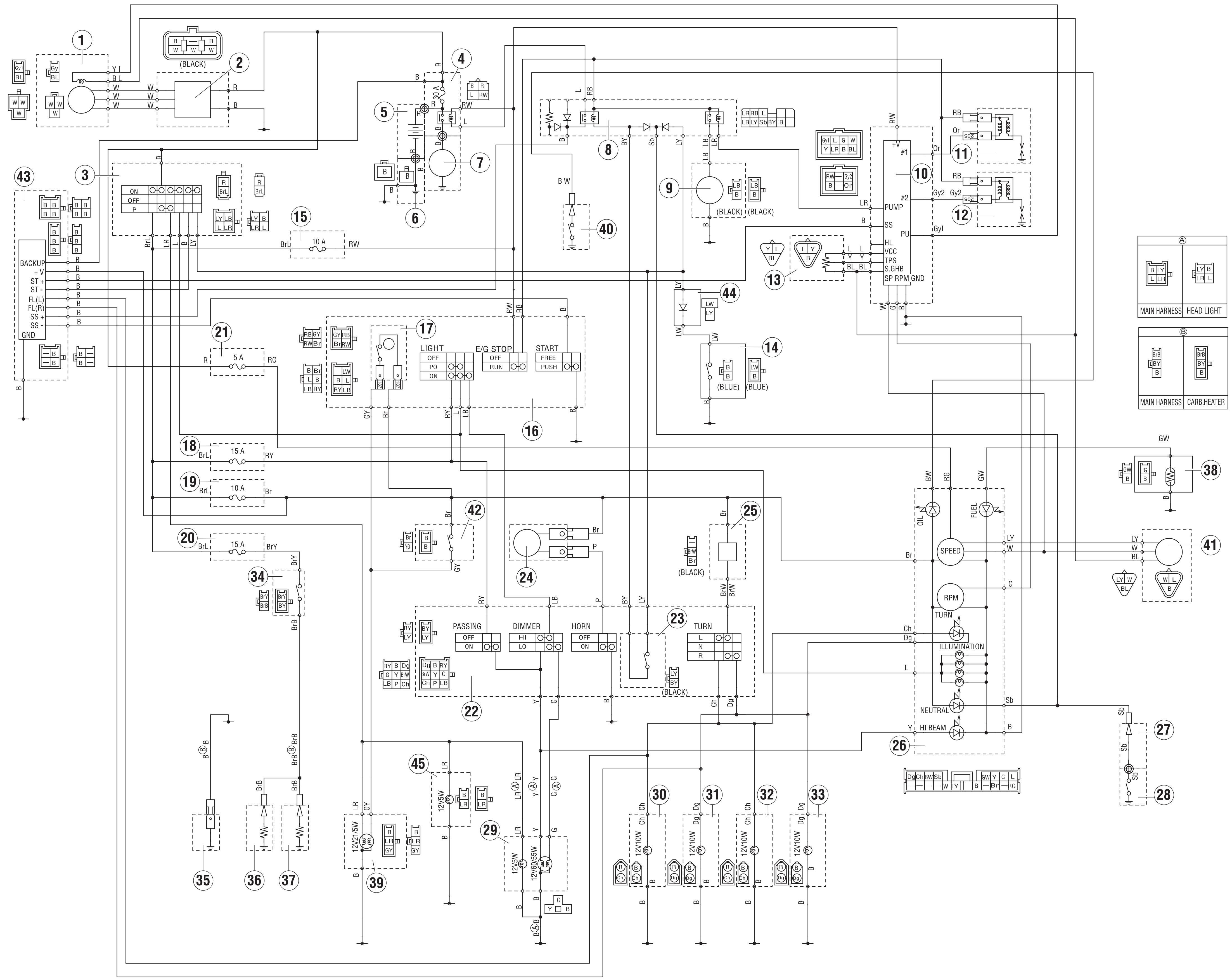
BULB BURNT OUT
- Improper bulb
- Faulty battery
- Faulty rectifier/regulator
- Improperly grounded
- Faulty main and/or lights switch
- Bulb life expired

FLASHER REMAINS LIT
- Faulty flasher relay
- Burnt-out bulb

FLASHER BLINKS QUICKLY
- Improper bulb
- Faulty flasher relay
- Burnt-out bulb

HORN DOES NOT SOUND
- Faulty battery
- Faulty fuse
- Faulty main and/or horn switch
- Improperly adjusted horn
- Faulty horn
- Broken wire harness

BT1100 WIRING DIAGRAM



ELECTRICAL SYSTEM

1. Pickup coil
2. Rectifier/regulator
3. Main switch
4. Starter relay
5. Battery
6. Wire minus lead
7. Starter motor
8. Starting circuit cut-off relay
9. Fuel pump
10. Igniter unit
11. Ignition coil 1
12. Ignition coil 2
13. Throttle position sensor
14. Sidestand switch
15. Ignition fuse
16. Right handlebar switch
17. Front brake switch
18. Headlight fuse
19. Signal fuse
20. Carburetor heater fuse
21. Backup fuse
22. Left handlebar switch
23. Clutch switch
24. Horn
25. Flasher relay
26. Speedometer
27. Neutral switch lead
28. Neutral switch
29. Headlight
30. Front turn signal light (left)
31. Front turn signal light (right)
32. Rear turn signal light (left)
33. Rear turn signal light (right)
34. Thermo switch
35. Carburetor heater earth
36. Carburetor heater 1
37. Carburetor heater 2
38. Fuel sender
39. Tail/brake light
40. Oil warning light
41. Speed sensor
42. Rear brake switch
43. Alarm system (Option)
44. Diode
45. License plate light

COLOR CODE

B ....Black
Br ....Brown
Ch ....Chocolate
Dg ....Dark green
G ....Green
Gy ....Gray
L...........Blue
Lg..........Light green
O ....Orange
P ....Pink
R ....Red
Sb ....Sky blue
W ....White
Y ....Yellow
B/L ....Black/Blue
B/W.......Black/White
B/Y ....Black/Yellow
Br/B.......Brown/Black
Br/L ....Brown/Blue
Br/W......Brown/White
Br/Y.......Brown/Yellow
L/B ....Blue/Black
L/R ....Blue/Red
L/W ....Blue/White
L/Y ....Blue/Yellow
R/B........Red/Black
R/G ....Red/Green
R/W.......Red/White
R/Y........Red/Yellow